This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

**Usage guidelines**

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

**About Google Book Search**

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

HRL
20
T-1

# REPORT

ON THE PROPOSED

# TRUNK LINE OF RAILWAY

FROM AN EASTERN PORT IN NOVA SCOTIA,
THROUGH NEW BRUNSWICK,
TO QUEBEC.

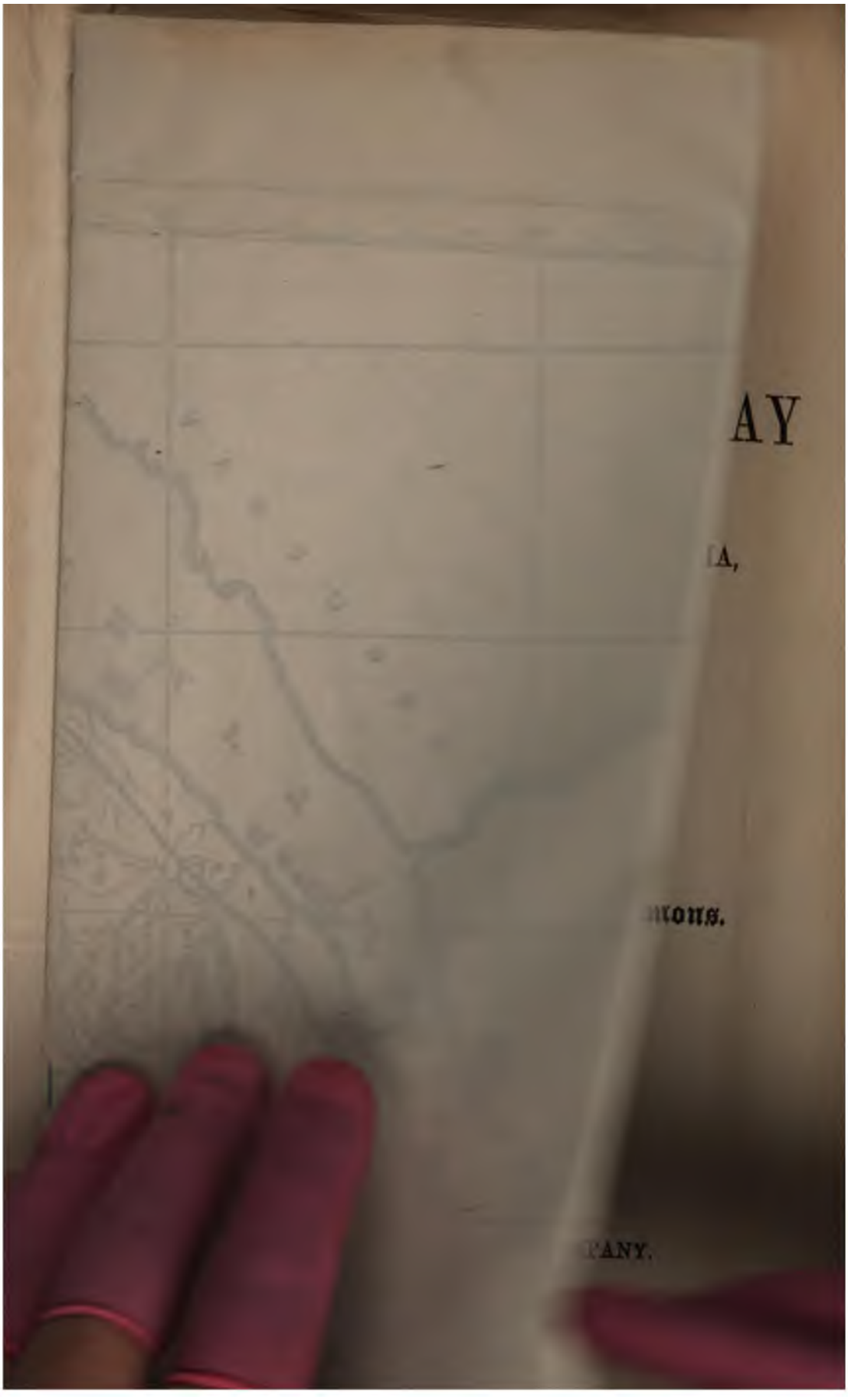
HE2807
R66

BY MAJOR WILLIAM ROBINSON,
CAPTAIN, ROYAL ENGINEERS.

**Printed by Order of the House of Commons.**

Ottawa:
PRINTED BY HUNTER, ROSE & COMPANY.
1868.

The Hopkins Library
presented to the
Leland Stanford Junior University
by Timothy Hopkins.


AY
A,
ions.
PANY.

HE2507
R66

# REPORT

ON THE PROPOSED

# TRUNK LINE OF RAILWAY

FROM AN EASTERN PORT IN NOVA SCOTIA,
THROUGH NEW BRUNSWICK,
TO QUEBEC.

BY MAJOR WILLIAM ROBINSON,
CAPTAIN, ROYAL ENGINEERS.

Printed by Order of the House of Commons.

Ottawa:
PRINTED BY HUNTER, ROSE & COMPANY.
1868.

HH

H.3267.

# MESSAGE.

## ELGIN AND KINCARDINE.

The Governor General transmits, for the information of the Legislative Assembly, copies of the Despatches from Her Majesty's Secretary of State for the Colonies, enumerated in the annexed Schedule.

GOVERNMENT HOUSE,
30th January, 1849.

### SCHEDULE.

| FROM | NO. | DATE. | SUBJECT. |
|---|---|---|---|
| | | 1848. | |
| Earl Grey to the Earl of Elgin... | 166 | 11th February... | *Customs' Act*—Assented to by the Queen—with letter from Treasury and the Board of Trade, respecting it. |
| Do. .. | 167 | 11th February... | *Ditto*—With Memorial from certain Iron Founders. |
| Do. .. | 175 | 6th March..... | *Ditto*—With Memorial from certain Glasgow Merchants. |
| Do. .. | 186 | 31st March..... | *Ditto*—Views of Her Majesty's Government. |
| Do. .. | 252 | 7th July ..... | Respecting the Canada Act, to extend *Copy-right* to persons resident in the United Kingdom. |
| Do. .. | 299 | 17th November... | *Halifax and Quebec Railroad*—Transmitting Report of Commissioners, and desiring to be informed of the views of the Provincial Legislature. |
| Do. .. | Military | 15th Sept.... / 22nd Dec. .. | Respecting the necessity of exempting from *duty, articles* imported for the *Military Service*. |
| Do. .. | 174 | 24th February... | Respecting the Montreal and Lachine, and the St. Lawrence and Industry Railway Acts. |
| Do. .. | 202 | 20th April..... | Enclosing Order of the Queen in Council, confirming seven reserved Railway Bills of 1847, and pointing out amendments required. |
| Do. .. | 206 | 29th April..... | Reporting the confirmation of certain Acts, and suggesting amendments to the Acts for incorporating the Montreal and Echo Lake Mining Companies. |
| Do. .. | 231 | 15th June..... | Suggesting amendments to the Act incorporating the Western Telegraph Company. |

# REPORT

ON THE

# PROPOSED TRUNK LINE OF RAILWAY

## FROM AN EASTERN PORT IN NOVA SCOTIA, THROUGH NEW BRUNSWICK, TO QUEBEC.

---

HALIFAX, NOVA SCOTIA,
August 31, 1848.

Three principal lines or routes for a trunk line of railway present themselves for consideration; and by combining portions of two of these lines together, a fourth and fifth route may be formed.

1st. Commencing at Halifax and crossing the Province of Nova Scotia to a port in the Bay of Fundy, from thence by a steamer to St. John, in New Brunswick, and then by Fredericton along the St. John River, to the Grand Falls.

From the Grand Falls by the best practicable route across to the mouth of the Rivière du Loup, on the St. Lawrence, and by the right bank of the St. Lawrence to Quebec.

The distance by this route would be as follows:—

| | Miles. |
|---|---|
| Halifax to Windsor | 45 |
| Windsor to Annapolis | 85 |
| Annapolis to entrance Bay of Fundy | 11 |
| Across Bay of Fundy to St. John (by sea) | 45 |
| St. John to Fredericton | 65 |
| Fredericton to Woodstock | 62 |
| Woodstock to the Grand Falls | 71 |
| The Grand Falls to the mouth of the Rivière du Loup | 106 |
| Rivière du Loup to Quebec | 110 |
| Total distance, Halifax by the St. John River to Quebec | 600 |

This line may be termed a mixed route—by railway and steamboat.

2nd. Commencing at Halifax and running to Truro at the head of the Bay of Fundy, thence over the Cumberland Mountains to Amherst, then along the coast from Bay Verte to Shediac, thence by a north-westerly course, crossing the Rivers Richibucto and Miramichi, above the flow of the tide, so as not to interfere with the navigation.

Then by the valley of the North-western Miramichi to Bathurst, on the Bay Chaleurs, along the cost of this bay to the Restigouche River, and by it and the valley of the River Metapedia to the St. Lawrence, and by the right bank of the St. Lawrence to Quebec.

The distance by this route would be as follows:—

| | Miles. |
|---|---|
| Halifax to Truro | 55 |
| Truro to Amherst and Bay Verte | 69 |
| Bay Verte to Shediac | 26 |
| Shediac to Miramichi River | 74 |
| Miramichi River to Bathurst | 56 |
| Bathurst to the Eel River, near Dalhousie | 48 |
| Dalhousie to the mouth of the Metapedia River | 30 |
| Metapedia River to the mouth of the Naget River, near the St. Lawrence | 86 |
| Along the St. Lawrence from this point to Quebec | 191 |
| Total distance by this route | 635 |

This, for the sake of reference, may be called the Halifax and Eastern or Bay Chaleurs Route, through New Brunswick to Quebec.

3rd. Commencing at the harbour of Whitehaven, near Canso, at the north-eastern extremity of Nova Scotia, thence along the Atlantic Coast to Country Harbour and Valley of the River St. Mary, thence by or near to Pictou and along the northern shore to Bay Verte.

From Bay Verte to or near the Bend of Petitcodiac, thence across to Boistown, and northerly to the Restigouche River, crossing it several miles to the east of Grand Falls.

From thence by the most direct and practical course to the Trois Pistoles River, and along the right bank of the St. Lawrence to Quebec.

The distance by this route would be nearly as follows:—

| | Miles. |
|---|---|
| Whitehaven to Country Harbour | 40 |
| Country Harbour to St. Mary's Valley and Pictou | 64 |
| Pictou and along the coast to Bay Verte | 77 |
| Bay Verte to Bend of Petitcodiac | 40 |
| Petitcodiac to Boistown | 80 |
| Boistown to the crossing of the Restigouche River | 115 |
| Restigouche River to Trois Pistoles, by the Kedgwick and Rimouski Valley | 105 |
| Along the St. Lawrence to Quebec | 131 |
| Total distance from Whitehaven by Boistown to Quebec | 652 |

This may be termed the Direct Route.

4th. Combining the Halifax route through Nova Scotia, and the direct route through the centre of New Brunswick.

The distances will be probably as under:—

| | Miles. | |
|---|---|---|
| From Halifax by Truro and Amherst to Bay Verte, as per Route No. 2 | 124 | In Nova Scotia. |
| Bay Verte to the Bend of Petitcodiac, Boistown, Restigouche River, as per Route No. 3 | 235 | In New Brunswick. |
| By the Kedgwick and Rimouski, to the mouth of the Torcadi | 75 | In Canada. |
| Mouth of the Torcadi to the crossing of the Trois Pistoles River | 30 | |
| Along the St. Lawrence River to Quebec | 131 | |
| Total distance from Halifax to Quebec by this route... | 595 | |

5th. Combining the Whitehaven Route through Nova Scotia, with the Eastern or Bay Chaleurs Route through New Brunswick to Quebec, the distances will be as under:—

| | Miles. | |
|---|---|---|
| From Whitehaven by Pictou and the North Coast to Bay Verte, as in Route No. 3..... | 181 | In Nova Scotia. |
| From Bay Verte to the Bay Chaleurs, and mouth of the Metapedia, as in Route No. 2..... | 234 | In New Brunswick. |
| Mouth of the Metapedia River to the mouth of the Naget | 86 | In Canada. |
| Along the St. Lawrence to Quebec..... | 191 | |
| Total distance from Whitehaven to Quebec by this route | 692 | |

Thus the distances will be as under:—

| | Miles. |
|---|---|
| 1st. By the mixed route, Halifax to Annapolis, by the St. John to Quebec, the distance will be..... | 600 |
| 2nd. By the Halifax and Eastern, or Bay Chaleurs Route, to Quebec... | 635 |
| 3rd. By the Direct Route, Whitehaven, Boistown and Quebec..... | 652 |
| 4th. By the Halifax, Truro, Amherst and Boistown, to Quebec..... | 595 |
| 5th. By the Whitehaven, Bay Verte and Bay Chaleurs, to Quebec.... | 692 |

The first line fails in the most essential object contemplated by the proposed Railway, viz., a free and uninterrupted communication at all times and seasons of the year, from the port of arrival on the Atlantic terminus in Nova Scotia to Quebec.

The intervention of the Bay of Fundy is fatal to this route.

In summer the transhipment of passengers and goods to and fro would be attended with the greatest inconvenience—loss of time and additional expense; whilst in winter it would be even still more inconvenient, and liable to be interrupted by storms and the floating masses of ice which then occur in the bay.

In the case of the conveyance of troops, transport of artillery and munitions of war, the crossing the bay would at any time be most objectionable, and if suddenly required in critical times might be attended with the worst consequences.

Commercially, too, it would destroy the fair prospect of the proposed line from Quebec to Halifax competing successfully with the route by the Gulf of the St. Lawrence, and with rival lines in the neighbouring States.

But there are also other serious objections to be offered against it.

Passing through New Brunswick and on the right bank of the St. John River, as it must necessarily do, to the Grand Falls, it would for a considerable distance, both before and after the reaching of that point, run along and close to the frontier of the United States.

In case of war, therefore, or in times of internal commotion, when border quarrels or border sympathies are excited, this line, when most needed, would be the most sure to fail, for no measures could be taken which would at all times effectually guard it from an open enemy and from treacherous attacks.

The passage across the Bay of Fundy so close to the shores of Maine, would invite aggression, and require a large naval force for its protection.

The engineering difficulties as the line approaches the Grand Falls from Woodstock would not be easily overcome.

The space between the St. John River and the Boundary Line becomes gradually contracted to a width of not more than two or three miles, and the country is broken and rough, whilst the banks of the St. John are rocky and precipitous for many miles below the Falls.

From the Grand Falls to the St. Lawrence, a distance of more than a hundred miles, the country is so far known as to make it certain that there is very difficult and unfavorable ground to be encountered, which would require careful explorations and extensive surveying.

This intervention of the Bay of Fundy, therefore, and the proximity of this line for a considerable distance to the frontier of the United States, was so objectionable and fatal to this route, that the attention of the officers and the exploring parties was, after a slight examination of the country between Halifax and Annapolis, directed in search of other and more favorable lines.

To understand the comparative advantages possessed by the *other* routes as well as to be able to weigh the objections which may be raised against each, and afterwards determine from their relative merits, which *is the best direction for the proposed line to take*, it will be necessary, previously, to give some description of the country through which the lines pass, the present amount and distribution of the population, and the engineering difficulties which were met with along the lines examined.

As it will be seen in the end, that only one of the lines, viz., the second, has been explored and carried out *successfully* from its terminus on the Atlantic quite through to Quebec, it may be perhaps considered superfluous to enter upon the discussion of rival lines, but the object to be gained by so doing, is to show that so much has been done, and is known of the country as to render further explorations for new lines unnecessary, because, if completed, they would not be likely to be recommended in preference to the one which will be proposed for adoption.

The distance from the Atlantic coast of Nova Scotia, to the bank of the St. Lawrence is about 360 miles in a straight line. Intersecting the country which must be traversed by any line of railway and crossing its course at right angles, are *five great obstacles* which have to be either surmounted or avoided :—

1. Is a broad range or belt of high and broken land which runs along the Atlantic shores of Nova Scotia, from Cape Canso to Cape Sable. The breadth varies from about twenty miles in its narrowest part up to fifty or sixty miles in other places. Its average height may be about five hundred feet. The strata of which it is composed consist of granite, slate, and a variety of rocks, hard and difficult to cut through. The characteristic features of the surface are rugged and uneven, and therefore very unfavorable for railway operations. No useful minerals of the metallic kind have been found in it, in quantities sufficient to work to advantage.

Valuable quarries of stone for building purposes are abundant, but these will be found everywhere nearly along the proposed line.

This formation is estimated to cover nearly two-thirds of the surface of Nova Scotia. It is, generally speaking, unfavorable for agriculture ; the timber on it is stinted in growth, and it is an object of some importance to pass through it and leave it behind as soon as possible.

If a line be drawn from the head of the estuary of the Avon, near Windsor, to the Great Shubenacadie Lake, and then across the Stoniacke River, along the upper parts of the streams in the County of Pictou, to the Gut of Canso, all the portion lying to the south of this line belongs to this formation, and all to the north of it to the more favorable and highly valuable formation of the carboniferous system.

The narrowest and shortest line by which this range or belt can be crossed occurs at Halifax, and at the same time, owing to a favorable break in the chain, at the lowest point in altitude ; the summit level through it not exceeding ninety feet.

The Halifax line (Route No. 2) is clear of it in twenty miles. Before the same can be done by the Whitehaven and Direct line (Route No. 3), it must follow the coast for upwards of thirty miles, as far as Country Harbour, and then a further course across it of another thirty miles ; involving in this distance *two* if not three tunnels, and must surmount a summit level of 400 feet.

2. The second great obstacle is the Bay of Fundy. This, as is stated, is fatal to the first route. By the other routes it can be turned and avoided.

3. The third obstacle is the range of Cobequid Hills. These extend all along the north shore of the Bay of Minas and very nearly across but not quite to the shore of the Straits of Northumberland. In breadth the range preserves nearly an uniform with of about ten miles. In altitude the hills average from 800 to 1000 feet. The lowest point, after a careful survey, was found to be at the Folly Lake, 600 feet above the sea. This range can be avoided and passed by the Whitehaven and Direct Route, but must be surmounted and crossed over by the Halifax and Eastern line (Route No. 2).

The prevailing rocks are granite, porphyry, and clay slate, in the upper portions ; along the shores of the Bay of Minas and on the northern side, the formation is of the red sandstone and the coal measures.

This range abounds with the most valuable minerals, of which a large mass of specular

iron ore, of unequalled richness, occurs close to the line, and only requires facility of carriage for bringing coals to the spot, to be worked with profit.

A large portion of this tract still remains ungranted, and timber of excellent growth, with abundance of the finest stone for building purposes, are to be met with, and still belonging to the Crown, can be had for the expense of labour only.

4. The fourth obstacle is the broad and extensive range of highlands which occupies nearly the whole space in the centre of New Brunswick, from the Miramichi River, north to the Restigouche. Some of these mountains rise to an altitude exceeding 2,000 feet.

The Tobique River runs through them, forming a deep valley or trough, which must be crossed by the direct line, and increases greatly the difficulty of passing by them.

The lowest point of the ridge overlooking the Tobique River, at which any line of railway must pass is 1,216 feet above the sea. Then follows a descent to the river of 796 feet in 18 miles, and the summit level on the opposite ridge or crest between the Tobique and Restigouche waters, is 920 feet above the sea, or a rise of 500 feet above the point of crossing at the Tobique water. These great summit levels, which must be surmounted, form a serious objection to this route.

The Eastern line, by the coast, avoids this chain altogether. The greatest summit level along it will not be above 368 feet, while the distance by each, from the Province line to Bay Verte to the Restigouche River (the northern limit of New Brunswick) will be, as nearly as possible, the same, there being only a difference of one mile in these two routes through this Province.

The rocks composing this chain of mountains are granite, various kinds of slates, grauwacke, limestone, sandstone, &c.

5. The fifth and last obstacle to be overcome, and which cannot be avoided by any of the routes, is the mountain range running along the whole course of the River St. Lawrence in a very irregular line, but at an average distance from it of about twenty miles. It occupies, with its spurs and branches, a large portion of the space between the St. Lawrence and the Restigouche River. The rocks and strata composing the range are of the same character and kind as the Tobique range. The tops of the mountains are as elevated in the one range as in the other.

The exploring parties failed in finding a line through this range, to join on to the direct line through New Brunswick, but succeeded in carrying on the Eastern or Bay Chaleurs Route, owing to the fortunate intervention of the valley of the Metapediac River.

The line which was tried, and failed, was across from the Trois Pistoles River, by the heads of Green River, and down the Pseudy, or some of the streams in that part, running into the Restigouche River.

A favorable line from the Trois Pistoles was ascertained along the Eagle Lake and Torcadi River, as far as the Rimouski; and it is probable that by ascending this river, and descending the Kedgwick River, this line, Route No. 4, could be completed.

But it is most improbable that it could compete in favorable grades with the Metapedia.

It will be allowing it sufficient latitude to suppose it will be equal in engineering merits; and that, if accomplished, it will give the Route No. 4 an apparent advantage of forty miles in distance.

A very striking characteristic in the geological formation of North America, and which has been noticed in the writings of persons who have described the country, is the tendency of the rock strata to run in parallel ridges in courses north-easterly and south-westerly.

On referring to the General Map No. 1, and confining the attention more particularly to that portion of country east and north of the St. John River through which any line must pass—this general tendency cannot fail to be remarked.

The River St. Lawrence—the main Restigouche River and intermediate chain of mountains—the Tobique River and mountains—all the streams in New Brunswick (the main trunk of St. John and a branch of the Miramichi excepted).

The Cobequid Range, the Bay of Fundy, and the high and rocky range along the Atlantic shore, have all this north-eastern and south-western tendency.

It will be evident, therefore, that any line from the coast of Nova Scotia to the St.

Lawrence has a general direction to follow, which is the most unfavorable that could have occurred for it, having to cross all these mountain ranges, streams, and valleys at right angles nearly to their courses.

The lines explored for the Direct Route through New Brunswick were obliged, on this account, to keep the elevated ground crossing the upper parts of the streams.

By so doing, a line was found to the Restigouche which may be considered just within the limits of practicability, but having very unfavorable summit levels to surmount.

And the peculiar formation of the strata, and general course of the valley and streams, renders it most improbable that any further explorations to improve this direct line through New Brunswick would be attended with much success.

Very fortunately for the Eastern line, one of the branches of the north-western Miramichi presented itself as an exception to the general tendency, and enabled that line to reach the coast of the Bay Chaleurs.

The distance across, in a direct line, from the coast of Nova Scotia to the St. Lawrence, has been stated at about 360 miles, forming the difficult and unfavorable portion of the line. When the St. Lawrence mountains are passed, then the tendency of the strata and courses north-easterly and south-westerly becomes as favorable for the remaining 200 miles along that river as it was before adverse.

The general character of the ground between the St. Lawrence River and the mountains, is that of irregular terraces or broad valleys, rising one above another by steep short banks, having the appearance as if the river had at some former periods higher levels for its waters.

The streams run along these valleys parallel with the course of the St. Lawrence, until, meeting some obstruction, they turn suddenly off, and find their way over precipices and falls to the main river.

Having described such of the physical features of the country which form *obstacles* in the way of the lines under consideration, it is proper next to describe those features and other resources which are advantages, and should be *sought* for by competing lines.

The geological systems which prevail through the intermediate country to the mountain ranges are the carboniferious and new red sandstone.

They include large deposits of red marl, limestone, gypsum, freestone of excellent quality for building purposes, and extensive beds of coal. Indications of the latter are met with in abundance from the banks of Gay's River, (twenty miles from Halifax,) up to the Restigouche River, and along the shores of the Bay Chaleurs.

Wherever these systems and minerals are found, a strong and productive soil, favorable for agricultural pursuits and settlement, is sure to accompany them. The surface of such a country, too, is generally low, or moderately undulating, and therefore the more of such a district that a line can be led through, the better for it.

In Nova Scotia this formation occupies its northern section, and amounts to nearly one-third of its whole area. It then extends all over the southern and eastern parts of New Brunswick.

In this respect, therefore, the Route No. 2 has a decided advantage.

The greatest and most valuable coal-field is that of Pictou.

It is situated on the south side of that harbour. The exact extent of the bed is not known, as it is broken by a great (geological) fault. It occupies, however, an area of many square miles.

The coal is bituminous, of good quality, and the veins of most unusual thickness.

Mines in it are extensively worked, and large exports from them are made to the United States. Iron ore is abundant.

This is an advantage in favor of the Whitehaven and Direct Route.

The next great coal district is the Cumberland field, and it is second only in importance to that of Pictou.

It is supposed to extend from the Macon River, west of Amherst, over to Tatmagouche in the Straits of Northumberland.

Some mines in it have been recently opened, and promise to be very productive.

The Line No. 2 passes over this field for miles, and may be considered from that circumstance, as not being deprived altogether of an advantage possessed by the other route.

The *great* agricultural capabilities of the eastern Counties of New Brunswick have

been described in the Reports of Mr. Perley, the Government Emigration Agent, which were presented to the New Brunswick Legislature in February, 1847, and ordered to be printed.

One most important object to be attained by the construction of a Railroad is the settlement of the public lands, and the encouragement of emigration from the Mother Country.

As bearing very strongly upon this point in the choice of the best direction for the line, I subjoin the following extract taken from Bouchette's Work on Canada, vol. 1, page 331. It is a quotation made by him from "The Commissioners' Report of 1821":—

"The Bay of Gaspé, and particularly the *Bay des Chaleurs*, are susceptible of the most improved agriculture. For the establishment of emigrants no part in Canada offers such immediate resources of livelihood as may be derived from the fisheries. It is a fact worthy of notice, that in the year 1816, when the lower parts of the Province were afflicted with a famine from the destruction of the harvest by frost, no such inconvenience was experienced at Paspebiac, nor at any other place within the level tract above mentioned."

The tract alluded to here is not clearly defined by the quotation, but it is supposed to mean the whole district along the south shore of the Bay Chaleurs.

This tends to show the effect produced by the vicinity of the sea, in moderating the temperature and saving the crops from untimely frosts. In this respect, therefore, the Line No. 2 has an important advantage over the one through the central and more elevated land of New Brunswick.

As the interior is approached, and the distance from, as well as the elevation above, the sea increases, the danger to crops from cold nights and early frosts also increases.

In the Madawaska Settlement, and on the Upper St. John River, great failures of crops have occurred from this cause, and wheat and potatoes are very liable to be destroyed,

From the bend of Petitcodiac to the St. Lawrence, a distance of upwards of 300 miles, the direct line would pass through a perfect wilderness, with not a single settler on the whole line, except a few at or near to Boistown.

Leaving engineering difficulties for the moment out of the question, the cost of construction would be materially increased by the extra difficulties attendant on the transport of necessary materials, and in supplying with food the labourers and others engaged on the line.

This disadvantage is not shared by the second route, which can be approached in numerous places along the Gulf shore by means of bays and navigable rivers.

The Direct Line No. 4 will not have such advantages to present to settlers as the second. On the contrary, if adopted, it might be found necessary to incur expenses for the establishment of small communities along the line to repair and keep it open.

The facilities for *external as well as* internal communication, and other advantages arising from commerce and the fisheries, which will be developed by the Eastern line (and entirely wanting along the Direct Route), will, it is fully expected, make its vicinity eagerly sought for by settlers, and that it will, in the course of no very great length of time, lead to the extension of that long-continued village which now exists with but little exception from Quebec to Métis (200 miles), from the shores of the St. Lawrence to the Atlantic Ocean.

An important item bearing upon the consideration of the best route is the present distribution of the population in New Brunswick and Nova Scotia.

In illustration of this part of the subject, and to afford a better idea of the nature of the country than can be given by a merely outline plan, a model map (No. 3) has been prepared, shewing the whole course of the lines. (Routes Nos. 2 and 4) from Halifax to the St. Lawrence, and by the latter over the Trois Pistoles River, beyond which the line is continued through a level, fertile and densely peopled district to Quebec.

The red line shows the proposed Route No. 2. The Halifax and Eastern or Bay Chaleurs line.

The black line shows the Direct Route, No. 4, from the bend of Petitcodiac.

The yellow tint shows the present settlements.

The green is the wilderness of uncleared forest, unsettled, and the far larger portion of it still ungranted and waiting for occupation.

It must be premised that a branch Railway from the City of St. John is contemplated

to pass up the valley of the Kennebecasis, and connect with the main trunk at the Bay of Shediac.

The survey of this line, ordered by the Provincial Government, is in progress; and from the latest information received, the line promises most favorably.

The total population of New Brunswick has been estimated to amount, at the beginning of 1848, to 208,012, distributed in the proportions as under:—

| | | | |
|---|---|---|---|
| County of | Restigouche | 4,214 | |
| " | Gloucester | 10,334 | |
| " | Northumberland | 19,493 | |
| " | Kent | 9,769 | |
| | | | 43,810 |
| " | Westmoreland and Albert | 23,581 | |
| " | King's | 19,285 | |
| " | St. John | 43,942 | |
| | | | 86,808 |
| " | Queen's | 10,976 | |
| " | Sunbury | 5,680 | |
| | | | 16,656 |
| " | York | 18,660 | |
| " | Carleton | 17,841 | |
| | | | 36,501 |
| " | Charlotte | | 24,237 |
| | Total | | 208,012 |

Of these, the first four, amounting to 43,810, are on the line of the proposed Route No. 2, and will be entirely thrown out by the adoption of the other.

Campbellton, Dalhousie, Bathurst, Chatham on the Miramichi, and Richibucto—sea-ports and shipping places of consequence on the Gulf shore; all of them susceptible of the greatest development, will be left isolated and cut off.

These ports are ice-bound during the winter months; and railway communication will be to them of the greatest importance.

It will affect most materially the interests of the City of St. John, and the receipts upon their branch Railway.

It will affect also most sensibly the receipts of the main trunk line.

Along the south bank of the St. Lawrence, from Quebec to Métis, there are settled along it in what can be only compared to one continued village for 200 miles, 75,000 inhabitants.

Of these, also, a large population, probably 12,000 in number, residing between the Rimouski and Métis River, will be deprived of the benefit of the railway, if the Direct Line be adopted.

To counterbalance the serious detriment which would thus be caused, this line would diminish the length of the branch line, likely to be made to connect them with Fredericton, which is the seat of Government, and contains about 6,000 inhabitants.

The population of Nova Scotia may be estimated to be about, viz.:—

| | | |
|---|---|---|
| City of Halifax and County | | 40,000 |
| County of | Cumberland | 10,600 |
| " | Colchester | 14,900 |
| " | Pictou | 30,300 |
| " | Sydney and Guysborough | 23,200 |
| Remaining Counties | | 111,260 |
| | Total | 230,200 |

The population of Cape Breton is estimated at 49,600.

Of the above, if the Whitehaven and Direct Route be adopted, the City of Halifax and County, amounting to 40,000, will be excluded from the benefit of the line.

If the Halifax and Eastern line (Route No. 2) be adopted, then the population of Sydney and Pictou, amounting to 53,500, will be excluded.

To the population in the southern or remaining counties (111,200), the Halifax Route will be of essential benefit.

From the other route they would derive no advantage whatever.

---

It is now proposed to give an account of the explorations and their results.

The dotted lines on the General Plan, No. 1, shew were these were made, and the courses taken.

In the season of 1846, the Cumberland Hills were carefully examined; sections with the theodolite were made, and barometrical observations taken, to ascertain the lowest and most favorable point for crossing them.

The line which has been cut out and explored for the military road was followed from the Bend of Petitcodiac to Boistown.

From Boistown the general course was followed, and levelled as far as the Tobique River, but the country was so unfavorable that new courses had to be constantly sought out.

A new line altogether was tried from the Tobique, as far as the Wagan Portage.

The results deduced from the observations and sections proved this line to be quite impracticable for a Railway.

Whilst the line was being tried, other parties explored from Newcastle on the Miramichi River, over to Crystal Brook on the Nipisiguit, the valleys of the Upsalquitch and its tributaries, and as far as the Restigouche River.

The country at the upper waters of the Nipisiguit, and the whole of the Upsalquitch valleys, were found to be rough, broken, and totally impracticable.

The result of this season's labours went to show, that the best, if not the *only*, route that would be likely to be practicable, would be by the North-west Miramichi to Bathurst, and then along the Bay Chaleurs.

During the winter, a small reconnoitring party (on snow shoes) was sent up the Metapediac Valley, as far as Metallis Brook, and they made their way across the country, from thence to the mouth of the Torcadi River on the Rimouski.

Their report on this line was rather favorable, and had there been any necessity for it, it would have been more fully explored the next season (1847).

As soon as this was sufficiently advanced to admit of the parties entering the woods, the explorations were resumed.

A grade line was carried over the Cumberland Hills. It was cut out through the woods, from the foot on side to the foot of the slope on the other, a distance of ten miles, and carefully levelled with a theodolite. This proved to be quite practicable.

The exploration of the Eastern line was again taken up.

It was commenced on the head of the tide, on the south-west Miramichi, and was carried up the valley of the north-west Miramichi over to and down the Upsalquitch River to Bathurst, and along the shores of the Bay Chaleurs to the Restigouche, up the Metapediac to the Métis, and along the bank of the St. Lawrence to the Rimouski and Trois Pistoles River.

The result of this exploration was so satisfactory that the party engaged upon it returned up the same route, surveyed it, and took the levels along it back to the Miramichi River.

An exploratory line was then cut through the greater portion of the flat and generally level country between this river and the Province line at Bay Verte.

An examination of the country was made from the Trois Pistoles River along the St. Lawrence to Quebec; which, with what had been done in Nova Scotia, during this and the former season, completed the whole of one good and favorable line from Halifax to Quebec.

The details are given in the accompanying Report, Appendix No. 1, General Plan No. 1, Model Map No. 2, and Book containing exploratory sheets, No. 16, containing plans and sections of the whole route, and comprises the line recommended to be adopted.

Unwilling to abandon the Direct Route through the centre of New Brunswick, by which, if a line could be successfully carried out, the distance would be so materially shortened, as is apparent by the mileage given in Route No. 4, it was determined to use

every effort to decide either the practicability or impracticability of such a line. To this end large parties were employed the whole season.

One party explored, cut, and levelled a line the whole way between the Napadogan Lake and the Restigouche River, a distance of ninety-six miles.

The line explored was a very great improvement upon the one of 1846.

It is considered to be so far satisfactory as to prove that a line for that distance can be found which would be within the limits of railway gradients.

The details are given in the Assistant Surveyor's Report, Appendix No. 2, with three exploratory sheets, Nos. 17, 18, 19, containing plans and sections of the ground passed over.

A large party was engaged in trying to find a line from Trois Pistoles River on the St. Lawrence, through the Highlands to the Restigouche River, for the purpose of connecting on to the New Brunswick party. The winter overtook them whilst still embarrassed in the Highlands at the head waters of the Green River.

The dotted lines on the General Plan No. 1, will show their attempts.

A line was tried up the Valley of the Abersquash, but it ended in a *cul-de-sac*. There was no way out of it.

A second line was carried from Trois Pistoles over to Lac-des-Isles, Eagle Lake; and by the middle branch of the Tuladi River, the north-west branch and head waters of the Green River were gained.

But this point was not reached except by a narrow valley or ravine of four miles in length.

A theodolite section was made of it, and it was found to involve a grade of at least one in forty-nine, and to attain that, heavy cuttings at one part and embankments at another would be necessary.

There is no occasion at present to enter upon the discussion of whether this should condemn a whole line, for having attained the Forks, at the head of the main Green River, no way was found out of it, and this explored line, like the first mentioned, must be considered to have ended in a *cul-de-sac* also.

Further details are given in the Report of Mr. Wilkinson, the Surveyor intrusted with the more immediate charge of this part of the line, in Appendix No. 3, with sketches attached to it.

It is just probable that a line might be found by way of the Kedgwick River and the Rimouski as far as the mouth of the Torcadi River, from which to the Trois Pistoles, there was ascertained to be no difficulty.

But as the advantages in every way, except distance, are so much in favor of the Eastern Line, it would only be incurring delay, and perhaps useless expense, in further explorations of this part of the country.

In the Report (Appendix No. 3) there is a third route suggested for examination and trial, viz., by one of the lower branches of the Green River and the Squattock Lakes.

Whether successful or not, it is liable to the objection of approaching the frontier of the United States.

There remains to be noticed the exploration for a line of railway from Whitehaven on the eastern coast of Nova Scotia towards Pictou and Bay Verte.

This was rendered necessary in consequence of the suggestion made by Captain Owen, R.N., to make Whitehaven the Atlantic terminus of the railway.

The details of this exploration are given in the accompanying Report, Appendix No. 4, and Exploratory Sheets, Nos. 20, 21, 22 and 24.

Engineering difficulties and expensive cuttings occur on this route.

From the commencement in the Harbour of Whitehaven the line *must* pass along a a barren and rocky coast, for upwards of thirty miles, to Country Harbour, before it can turn off towards the interior. And it cannot do this and get clear of the sea shore without the necessity of making a tunnel of about a mile in length through a ridge of whinstone.

Again, at the Falls of the St. Mary River there will be required a tunnel of about a quarter of a mile, and a viaduct across a valley, of about 500 feet in length.

The summit level occurs between Lake Eden and Beaver Lake, and is 400 feet above the sea.

At Grant's Bridge, on the East River, for nearly three miles in length, there would necessarily be several expensive cuttings through rocks of sandstone and limestone.

The length of this line from Whitehaven to Bay Verte is estimated at 181 miles. From Halifax to the same point is 124. Leaving a difference of fifty-seven miles.

If the Direct Route (No. 3) could be established, it would add seventeen miles to the trunk line.

But as it is not to be supposed that Halifax, the capital and great commercial city of the Province, would in such a case allow itself to be excluded from the benefits of the proposed Railway, then it would involve, in addition to this seventeen miles of trunk railway, a branch line of probably ninety miles.

Or if the Eastern (Bay Chaleurs) line through New Brunswick be added on to it, as in Route No. 5, then it will involve no less than fifty-seven miles extra of trunk line, and the same necessity for the branch line of ninety miles mentioned.

To compensate for such disadvantages it must be shown that Whitehaven has *the most paramount claims* to be selected as the Atlantic terminus, in preference to Halifax.

The Harbour of Whitehaven is 120 miles nearer to England by sea than Halifax. Equivalent to, in ocean navigation by the steamers, ten hours.

This, it is readily conceded, is a very great advantage, and were there no drawbacks or other considerations in the way, it would be quite sufficient to give that port the preference.

It is a well-known fact, however, that there is a time and season in the year when the Cunard steamers cannot keep their direct course to Halifax even, but are compelled, by fields of ice, to keep to the southward, and sometimes pass to the south of Sable Island.

During this time, which occurs in the spring of the year, and may last for two or three months, there would be some risk in there making direct for the more northern port of Whitehaven. And if for these three months the steamers were obliged to make Halifax their port, then for that time the Whitehaven line would be useless.

In respect to the advantages which it is said to possess, of remaining open all the year round, it is not quite clear that it does so.

From enquiries made on the spot in the summer of 1847, Captain Henderson learned that the preceding winter the harbour had been frozen over entirely, five to six inches thick,* and that it was sometimes blockaded up and much incommoded by ice.

Subsequently, however, and during this winter, when the objects of the enquiries made there in the summer became known, and the advantage of the Railway spoken of, a statement accompanied with affidavits was forwarded with a view to counteract the effect of the information given to Captain Henderson and the parties exploring there.

They are given in the Appendix No. 5 to this Report.

They tend to show that though the immediate entrance to the harbour may be, and generally is clear, yet that large quantities of floating ice find their way through the Gut of Canso, and by Cape Breton, which pass off in a southerly direction, crossing the direct path of steamers and vessels from Europe.

The coasting vessels keeping in shore are not so liable to be molested by it.

The harbour is admitted to be a fine sheet of water, but it does not and cannot vie with Halifax, either in appearance or capacity.

Referring to Lieutenant Shortland's Report, Appendix No. 5, who made a survey of it in obedience to the directions of Captain Owen, R.N., it appears that it is not free from the objection which is made against the Port of Halifax, and is its only drawback, viz., the prevalence of fogs.

Lieutenant Shortland says, "that in foggy weather the harbour (Whitehaven) is difficult to approach, especially to a stranger, as soundings in shore are very irregular, and I have not been able to learn any good indications of its vicinity to be gathered from the lead, so as to render its approach by that means certain; and Torbay, its immediate neighbor to the westward, is a dangerous place to get into.

"From the fishermen and small coasters I understand the currents round the point are uncertain and generally depend upon the wind, though the prevailing current is to the westward.

* Vide Appendix No. 5.

"I experienced this current in a boat when I visited the outer break; it was then setting to the westward, at the rate of one mile and a half per hour at least. I also perceived vessels in the offing setting rapidly in the same direction, the breeze was from the eastward and light, though it had previously blown hard from the same point.

"We also, on our passage from Halifax to Canso, during a fog, with the wind from south-west, experienced an easterly current, but the land once made, the harbour is easily attained, especially by a steamer."

This can scarcely be considered a favorable report of its advantages as a harbour intended for the great Atlantic terminus.

Accommodation and safety for a fleet of merchantmen could be expected there, as is to be found at Halifax.

To make it a safe approach Lieutenant Shortland continues thus:

"A judicious arrangement of fog-signals and light-houses with buoys, on the principal dangers, and a good survey with the sea-soundings well laid down, would make the approach in the night, or during fogs, attended with small danger to a careful seaman."

One of the undoubted results of the Railway will be to make Halifax, if it be made as it ought to be, the Atlantic terminus, the great emporium of trade for the British Provinces and for the Far West.

Whitehaven has not the capacity for this, and in winter it is evidently dangerous for sailing vessels, and the selection of it as a terminus would be to exclude Halifax altogether, or to compel the formation of a branch railway of ninety miles in length, in addition to fifty-seven miles of trunk railway.

It involves also the necessity of making expensive arrangements; light-houses must be built, depôts for the supply of the steamers must be made, fortifications must be erected, and accommodation for a garrison provided. For the terminus of a great line of railway would need protection in time of war.

At present there are only a few fishermen's huts.

The probable saving of ten hours of time in an ocean voyage which varies even with the Cunard steamers, from nine to eighteen days, is not of such all-absorbing magnitude as to entail by the choice of the terminus, such a fearful amount of extra expense and inconvenience to a whole Province.

At a more advanced period, perhaps, when the Provinces have attained all the prosperity they have a right to expect from this and other great works which would follow as surely as effect follows cause, then it may be time to consider the propriety of making a *branch* to Whitehaven.

Its selection now as the terminus would most materially affect the receipts to be expected from the traffic.

*Whitehaven*, therefore, with its longer and more expensive line of railway, full of engineering difficulties, passing for miles through a district of country, rocky, barren, and unfavorable for agriculture, benefiting a comparatively small proportion of the inhabitants, to the exclusion of the capital and the greatest amount of the Province;—or else involving the necessity of making a branch line of ninety miles in length, is decidedly recommended to be *rejected*.

And the City and Harbour of Halifax (one of the finest in the world) *is recommended to be selected* as the Atlantic terminus for the proposed line of railway.

That part of the Direct Route (Nos. 3 and 4), viz., the line from the Bend of Petitcodiac by Boistown to the Restigouche and the St. Lawrence, crossing the range of New Brunswick mountains, having to surmount two summit levels of 1,216 and 920 feet, causing heavy grades, and increasing materially the cost of transport; passing through a totally unsettled and wilderness country; involving greater difficulties in the transport of the materials necessary for its construction, and supplying food to the labourers engaged in its formation; excluding the towns and settlements on the Gulf shore, and so preventing the development of the vast resources of the country to be derived from the fisheries; and also inflicting a serious loss to the interests of the main line, and to the intended branch from the City of St. John in New Brunswick, is, notwithstanding its one great advantage of diminished distance, recommended most strongly to be *rejected*.

And the Route No. 2, from Halifax to Truro, at the head of the Bay of Fundy, passing over the Cobequid Hills, and on or near to Amherst and Bay Verte, crossing from

thence over to the Rivers Richibucto and Miramichi, above the flow of the tide, so as not to interfere with their navigation; then by the valley of the North-west Miramichi and Nipisiguit River to Bathurst; then along the shore of the Bay Chaleurs to the Restigouche River; then by the valley of the Metapediac over to or near to the River St. Lawrence; then by the route as shown in the General Plan No. 1, along the banks of the St. Lawrence to Rivière du Loup, and from thence continued through either the second or third concessions along the river until it approaches Point Levi, is recommended as the *best direction* for the Proposed Trunk Line of Railway from an Eastern Port in Nova Scotia, through New Brunswick, to Quebec.

It combines in the *greatest* degree the following important points:—

1st. The immediate prospect of direct, as well as the greatest amount of remuneration for the expenditure to be incurred; the opening up a large field for provincial improvements, for the settlement of emigrants, and by affording the opportunity in addition to *internal*, of *external* communication, by means of the Gulf of St. Lawrence and the Bay of Chaleurs, it will tend to develop in the highest degree the commerce and the fisheries of the Province of New Brunswick.

2nd. Passing along the sea coast for a great distance, and capable of being approached at several points by bays or navigable rivers, it possesses the greatest facilities for construction, tending to reduce the expense, and by its more favorable grades, also the cost of working and subsequent maintenance.

3rd. By passing over a less elevated country, and at the least distance from the sea, there will be less interruption to be apprehended from climate, whilst the more favorable grades will increase the efficiency and rapidity of intercourse.

4th. Passing at the greatest possible distance from the United States, it possesses in the highest degree the advantage to be derived from that circumstance of security from attack in case of hostilities.

The best general direction for the Proposed Trunk Line of Railway being admitted to be that of Route No. 2, viz., the Halifax and Eastern, or Bay Chaleurs Route, some additional remarks may be made upon its peculiar advantages, as well as upon the few engineering difficulties which occur, and in explanation of the plans and sections forwarded.

The details of the line are given in the Appendix No. 1. The plans referred to are the General Plan No. 1, the Model Map No. 2 (which should be stretched out on the floor to be properly viewed), and the book containing fifteen exploratory sheets of plans and sections which relate exclusively to this line.

The City of Halifax is situated on the western side of the harbour, whilst the best site for the terminus is on the opposite shore at Dartmouth.

The distance to Quebec from the latter will be four miles shorter than from the former; and one great advantage is, that its short line is as yet comparatively free from wharves and commercial establishments, and an extensive terminus can be formed there at less expense and inconvenience than on the Halifax side, where the Government dock-yard and private establishments would interfere materially in the selection of a good site for it.

At Dartmouth it is expected that vessels entering the harbour will be able to unload at the railway premises, or probably into the railway cars, whilst an equally good terminus is to be had at Point Levi, opposite to Quebec. The same railway cars, loaded from the ships in harbour at Halifax, will thus, after running an *uninterrupted* course for 635 miles, be delivered of their contents into the boats if not into the holds of vessels in the River St. Lawrence. The same can of course be done from the River St. Lawrence to the vessels waiting in Halifax Harbour.

Such an uninterrupted length of railway, with such facilities at its termini, will be, it is believed, unequalled in the world.

In the transmission of goods and merchandise this will be a most favorable point in competing with rival lines. The American railways, especially along the Atlantic States, are constantly interrupted, and passengers have to transfer themselves not only from cars to steamboats, but sometimes from one set of carriages to another set, in waiting for them on opposite banks of a river.

In Nova Scotia the passage over the Cobequid Hills cannot be effected without heavy grades of one in seventy-nine and one in eighty-five; but as these occur, the one ascending, and the other immediately descending, and only for ten miles, the inconvenience can be easily got over by affording an assistant engine for the goods' trains at that part. No engineering difficulties are expected to occur from this up to Restigouche River.

It is necessary, however, to make some remark in reference to the sections shown in the Book of Exploratory sheets 6 and 7, comprising that part of New Brunswick lying between Shediac and the North-west Miramichi.

The whole of this portion of the country is believed to be generally low and flat, with occasional undulations. The section run through it in the previous season of 1846, towards Boistown, confirmed this impression.

Its exploration and examination, therefore, was left to the last, and it was not until the really formidable-looking obstacles had been explored and successfully got over, that the attention of the parties was turned to it.

As at this time the season was rapidly closing, the exploring parties were directed to cut *straight* lines through it, as the best means of obtaining the general altitudes and a knowledge of the country. No attempt was made to contour the hills. The sections, therefore, in these two sheets are not grades for the railway, but of the ground passed over by the straight lines. With the exception of the immediate banks of the St. Lawrence, this is expected to prove one of the easiest portions of the line.

When the line reaches the mouth of Eel River, it cannot proceed direct on to Dalhousie, but must turn off up the valley of that river.

Two courses are afterwards open to it, one to turn off through a valley, by which it can soon gain the Restigouche, the other to proceed on to the head waters of Eel River, and then turn down to that river. Which is the best of these two routes can be better determined when the detailed surveys of the route are made.

The most formidable point of the line is next to be mentioned,—this is the passage up the Metapediac valley.

The hills on both sides are high and steep, and come down, either on the one side or on the other, pretty close to the river's bank, and involves the necessity (in order to avoid curves of very small radius) of changing frequently from one side to the other. The rock, too, is slaty and hard. From this cause, twenty miles of this valley will prove expensive, but the grades will be very easy.

About fourteen bridges of an average length of 120 to 150 yards will be required up this valley. There is also a bridge of 2,000 feet long, mentioned in the detailed Report as necessary to cross the Miramichi River.

But bridging in this country is not the same formidable affair that it is in England.

The rivers are nearly always shallow, and the materials, wood and stone, are close at hand.

The bridges in the United States, on the best lines, are built of wood on the truss-work principle, with stone piers and abutments.

On the Boston and Albany lines, and on many others in the New England States, the bridge generally used and approved of is known as "Howe's Patent Truss Bridge."

The cost of this kind of bridge, as furnished by the parties who have purchased the patent, is as follows:—

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| For Spans of | 60 | feet, single track, | $11 | per foot..... | £2 | 5 | 10 | Stg. |
| " | 100 | " | 18 | " ..... | 3 | 15 | 0 | " |
| " | 140 | " | 21 | " ..... | 4 | 7 | 6 | " |
| " | 180 | " | 27 | " ..... | 5 | 12 | 6 | " |
| " | 200 | " | 30 | " ..... | 6 | 5 | 0 | " |

The cost for double track would be about 55 per cent. additional.

The price includes the whole of the superstructure ready for the rails, but not the piers and abutments.

The bridge over the Connecticut River at Springfield, is built on this principle; it has seven spans of 180 feet each, and the sill of the bridge is 30 feet above low water. On other lines the same kind of bridge is used, but no iron work is permitted (the unequal

expansion and contraction of this metal is objected to), and the addition of an arch is introduced.

A bridge built on this principle on the Reading Railroad, 1,800 feet long, cost $40,000, equivalent to £8,330 sterling.

Soon after passing the valley of the Metapediac, the great obstacle of the St. Lawrence chain of mountains is got over, and the line may range away towards Quebec, having, however, occasionally a river or ravine to cross, whose passage requires consideration.

At the Trois Pistoles, the stream in the course of ages has worn out a very awkward and deep ravine. The bank on one side is generally steep and abrupt, whilst that on the opposite is low and sloping away back for a long distance, before it again reaches the height of the table land.

The most favorable site for crossing it occurs at about eleven miles from the St. Lawrence, where the two banks become nearer to each other, and are more equal in height.

At this point the breadth of the stream is 100 feet at bottom. The width between the banks at top 500, and the depth is nearly 150 feet. The banks are rocky. Though formidable it is by no means impracticable.

On the New York and Erie Railway there is a bridge whose roadway is 170 feet above the bottom of the ravine, which it crosses by one span of 275 feet. Its cost was £5,200.

From Rivière du Loup to Quebec, the Railway might but for the snow be carried almost at a surface level.

Through the whole of New Brunswick, for 234 miles, and through Lower Canada as far as Rivière du Loup, 167 miles, there will be found along the line abundance of timber and stone (including limestone) of the best quality for building purposes. There will be found also, in New Brunswick more especially, abundance of gravel for the superstructure.

In Nova Scotia, the Railway will have to pass with but little exception through land which has been sold or granted away to individuals. The exception will be the other way in New Brunswick. It will be seen on reference to the Model Map, that it approaches the settlements between Bay Verte and Shediac, and skirts along the Bay Chaleurs.

In Canada, from the mouth of the Metapediac to the Trois Pistoles, it runs through still ungranted land. But for the last 110 miles between Riviére du Loup and Quebec, it runs through a densely settled country.

Until the detailed surveys are made, and the precise location of the line marked on the ground, it will be impossible to state precisely the exact number of miles it will pass through Crown land.

If the following estimate be taken, it will not be much out—

| | | |
|---|---|---|
| In Nova Scotia | 15 | miles. |
| New Brunswick | 200 | " |
| Canada | 160 | " |
| Total | 375 | " |

The following synopsis will show approximately the quantities of ungranted land in the Counties through which the line passes :—

*In Nova Scotia.*

| | Acres. | |
|---|---|---|
| Halifax County | 780,000 | |
| Colchester | 120,000 | |
| Cumberland | 180,000 | |
| | | 1,080,000 |

*In New Brunswick.*

| | | |
|---|---|---|
| Westmoreland County | 301,000 | |
| Kent | 640,000 | |
| Northumberland | 1,993,000 | |
| Gloucester | 704,000 | |
| Restigouche | 1,109,000 | |
| | | 4,747,000 |

| | | |
|---|---|---|
| *In Canada.* | | |
| Bonaventure | 2,000,000 | |
| Rimouski | 5,000,000 | |
| Kamouraska | 500,000 | |
| L'Islet | 600,000 | |
| Bellechasse | 500,000 | |
| | | 8,600,000 |
| **General total** | | 14,427,000 |

The land for the Railway will have to be purchased in Nova Scotia for nearly its whole course, and in Canada for the 110 miles mentioned.

The latter, however, it is expected, will cost very little more than the expense which it would be necessary to incur in cleaning, getting out the stumps, and preparing the wild lands for the Railroad.

No part of the line will ever be at any great distance from Crown lands; but it will be a question of detail for this part as well as for the Nova Scotia section, whether it will be more advantageous to cut and convey from them the timber and materials required, or purchase them.

The direction of the proposed line being determined upon, the next points which present themselves for consideration are, the character of the road and method of construction.

In the first instance it is considered that one line of rails will be sufficient, but in taking ground for the Railway and stations, and wherever the line passes, regard should be paid always to the prospect of its being made at some future time a double track. And in the anticipation of a heavy traffic, which there is a fair prospect of soon passing along it, and with a view to ultimate economy, as well as the saving of much inconvenience, it is recommended that the road (being intended for the great trunk line) should be constructed at once in a substantial and permanent manner, with a good heavy rail, capable of bearing high rates of speed for passenger trains.

On all the principal lines of railway in the United States, the flat iron bar is everywhere being discarded, and the H or T rail, generally of 56lb. to the yard, is being substituted for it.

On several of the lines also a double track is being made, and the works constructed are of a more permanent character than formerly.

Much has been said in praise of the cheap method of making railways in America, and the advantages to be derived from it in a new country.

As an example of this system and its practical results, the Utica and Syracuse Railway may be here quoted.

This road is fifty-three miles in length and forms part of the Great Western Line, connecting Albany on the Hudson River, with Buffalo on Lake Erie—one of the principal lines in the country.

In its construction more than a usual amount of timber was used. For a considerable portion of its length (upwards of nineteen miles) it passed through a deep swamp. Piles were driven into this, to support a long continued trestle-bridge, over which the railway track was carried upon longitudinal bearers.

For the other thirty-three miles the grading was made in the usual manner by excavations and embankments: but the superstructure was of wood.

Upon the grading in the direction of its length, a small trench was excavated, and a sill of wood was firmly bedded in it. Where the sills abutted end to end, they were supported by a piece of wood, of the same section, laid beneath them. At right angles to and upon the upper surfaces of the sill were spiked cross-ties, and again, at right angles to the cross-ties, and immediately over the sills, were laid the longitudinal wood-bearers, to which the iron plates were firmly spiked. The centre of the rail and sill were in the same vertical plane.

Thus everything was done for economy: as much wood as possible being used. This railway for its construction and equipment cost on an average only £3,600 per mile.

It was thought worthy, in 1843, to publish an account of it in London; and it forms

the chief subject of a volume, thus entitled, "Examples of Railway Making, which, although not of English practice, are submitted to the Civil Engineer and the British and Irish Public."

The following Report is extracted from the Annual Statement of the Secretary of State to the Assembly of the State of New York, dated 4th March, 1847 :—

"Syracuse and Utica Railroad has been opened for the transportation of passengers for the last eight years.

"The company having determined to relay the road with an iron rail of the most improved form, have contracted for a considerable portion of the iron necessary, and are proceeding with the intention of laying a substantial structure adequate to the proper performance of the business required.

| | |
|---|---|
| "Present wood structure has cost the company - - | $417,075 55 |
| "The iron now laid thereon is the flat bar, and will be useless, and therefore will be sold. It is hoped that there may be derived from the sale of it - - - - - - | 80,000 00 |
| "Leaving a sum of - - - - - | $337,075 55 |

which has been expended for the cost of the wood structure, which, in addition to a large annual amount for repairs, will be practically worn out, sunk and gone, when the new structure is laid and used. The new structure, it is supposed, will cost about the same as the former, toward which, it is hoped, the old iron will pay, as above, 80,000 dollars, leaving the sum of about 300,000 dollars to be raised by the company on its credit.

"This will, when paid, reimburse the capital of the company for the equivalent amount, which has been appropriated to the worn-out structure. In addition to the cost of the new structure, there will be required a considerable sum for new engines, cars, &c. The demand upon the company for the transportation of property at the close of the canal has entirely exceeded its capacity to do this business. Property destined for sale in the eastern markets, in large quantities, was stopped at most points upon the line of railroad contiguous to the canal. Being practically confined to the winter months in this branch of business, it cannot be expected that the company could provide a supply of cars for this sudden and extraordinary demand, when they must stand idle and go to waste during two-thirds of the year.

"When the road shall be relaid with the proposed iron rail, the public will require that the trains shall be run with increased speed. In relation to this subject it is deemed proper to refer to the following suggestions contained in the report of this company, made last year:—

"'Very great embarrassment is experienced from the fact, that cattle are allowed to run at large, and to impede and so often delay the trains as at present. It is a serious matter, and unless more care shall be bestowed by the owners in restraining them, either at their own suggestions or in pursuance of some proper law to be passed, it will be found very difficult to make good time upon this line. A part of our business must be always done in the night, and it is then we experience the great hazard. The trains are frequently thrown off by them, and the danger to the persons in charge and to the passengers is imminent. The owners always insist upon pay for their animals destroyed, without reflecting upon the great damage that they cause to the property of the company, and the more fearful injury that might ensue to passengers. If the owners will not take care of them, it is impossible to keep them off. In Massachusetts much less difficulty in this respect is experienced; for there, it is believed, a penalty is incurred by the owner of domestic animals that go upon the railroad. Our business is conducted with all possible care in this respect, and the enginemen suitably feel the risk of life or limb (which to them is almost as important) that they incur from the growing evil.

"'A very proper law in this State has guarded the public and the company against direct wanton injury to the trains by individuals. It is submitted that *negligence* in allowing animals to run upon the railroads should be prevented by some suitable restraints.'"

Some of the inconveniences arising from a cheap railway may be learned from this Report.

At this time the total amount spent upon its construction appears, from the same report, to have been 1,098,940 dollars, equivalent to £4,520 sterling per mile.

The new superstructure, it was supposed, would cost about the same as the former, viz., 417,075 dollars, or about £1,640 sterling additional, which will make the price of this railway, when completed as intended, £5,960 per mile.

In other parts of the States where these trestle bridge or skeleton railways have been made, instances have been known of the locomotive slipping down between the rails, which have warped outwards.

With a view, therefore, to ultimate economy and to save inconvenience and interruption to the traffic when once established, it is most strongly recommended that the line, whenever commenced, shall be at once properly and efficiently made.

In determining the form of the road it is necessary to bear in view that it will pass through a country everywhere liable to be obstructed by heavy falls of snow. It does not appear, however, from the results of enquiries made in the United States, that anything beyond inconvenience, and some additional expense in the cost of working the line, is to be apprehended from this cause.

The Railway from Boston to Albany, which crosses the range of mountains between the Connecticut and Hudson Rivers, attaining upon them an elevation of upwards of 1,400 feet above the sea, to which it ascends by a grade of about eighty feet per mile for thirteen miles, traverses a country subjected to the same sort of winter as the British North American Provinces.

The average depth of snow in the woods is from three to four feet, which is not much less than it is in the woods of New Brunswick and Canada.

In 1843, a year remarkable for the great number of snow storms which occurred, there were sixty-three falls of snow, but the traffic was not interrupted to any very serious extent, not more than two or three trips.

To keep the roads clear, two descriptions of snow ploughs are used, one for the double track, and another for the single.* In the former, the *share* of the plough travels immediately over the inner rail, throwing the snow outwards from the track. It is first used on one track, and then runs back upon the other.

In the single line the ploughshare travels in the centre of the track, throwing the snow off at once upon both sides.

For the double track, the snow plough weighs from five to six tons, and costs about £125. For the single track it is somewhat lighter.

The plough requires generally, when run without a train, two engines of 20 tons each, or with a train, three engines.

When the fall of snow does not exceed a few inches, the small plough always fixed in front of the engine, consisting of an open frame-work projecting about five feet in front, and called a "*Cow scraper*," is found, when cased over, to be sufficient to clear the line. When the fall is deeper, the plough is used immediately after the snow has ceased to fall.

It can be propelled by three 20 ton engines through three feet of newly fallen snow at the rate of six miles an hour.

If the fall does not exceed two feet, it can travel at the rate of fifteen miles an hour.

The drifts through which it is propelled are sometimes fifteen feet deep, and from 200 to 300 feet long, and at others eight or ten feet deep, and from a quarter to half a mile in length.

The line of railway is marked in divisions of about eight miles, to each of which eight or ten men are allotted, who pass along the line each day with small hand-ploughs, picks, &c., clearing away the show and ice which the trains collect and harden between the rails and the roadway.

It is found that the freezing of the snow or rain upon the rails does not impede the heavy engines, as the weight of the forward wheels is sufficient to break it, and enable the driving wheels to bite.

Whenever, from local causes, the snow is found to drift on the line of railway, snow-

* Vide Plans Nos. 30 and 31.

fences are erected, which are very effectual. They are simple board fences from ten to fifteen feet high, placed from ten to twenty feet back from the roadway.

In wet weather the rails become very slippery, but the difficulty is overcome and the wheels enabled to bite upon the steep gradients by the use of sand boxes, which are fixed in front of the engine and immediately over the rails. These can be opened at pleasure by the engine-driver, and the sand is used wherever necessary,

The means thus successfully adopted to overcome the obstacles arising from ice and snow are employed much in the same way upon all the railways which are exposed to them.

In the year 1847 the expense incurred under this head (removing ice and snow) upon the Western Railroad in Massachusetts, was, according to the official return, $2,763, equivalent to £575 sterling.

Upon many of the other lines expenses under the same head are returned, but very much smaller in amount.

In places where the rails are not raised above the general level of the country, much greater difficulty is experienced in keeping the lines clear of snow than in parts where there are embankments.

From the foregoing it does not appear, therefore, that snow need be considered an insurmountable obstacle to the formation of a line of railway from Halifax to Quebec.

To obviate, as much as possible, the liability to interruption from this cause, it is recommended that in the construction of the line, it be adopted as a principle, that the top of the iron rail be kept as high as the average depth of snow in the country through which the line passes.

In Nova Scotia this will require probably an embankment of two feet high, gradually increasing as it proceeds northward to the St. Lawrence and along the flat open country on its banks, to five or even six feet.

The whole of that part of British North America through which this line is intended to be run, being as yet free from railways, the choice of gauge is clear and open.

Without entering into and quoting the arguments which have been adduced in favor of the broad or narrow gauge of England, as it is more a question of detail than othewise, it will be deemed sufficient for the present Report to recommend an intermediate gauge. Probably five feet six inches will be the most suitable, as combining the greatest amount of practical utility with the least amount of increased expenditure.

With the object of proceeding on to the consideration of expense of construction, the proposed trunk line will be supposed to have a single track with one-tenth additional for side lines and turn outs, to have a rail 65 lbs. to the yard, supported upon longitudinal sleepers with cross-ties, similar to the rail used upon the London and Croydon line, the wood to be prepared according to Payne's process, to have a gauge of five feet six inches, and, as a principle, the top of the rails to be kept above the level of the surface of the ground, at a height equal to the average depth of the snow. For the best information as to the cost of making such a railway, reference must be made to the works of a similar character in the United States.

At about the close of the year 1847, there were in that country nearly 5,800 miles of railway completed or in progress. The average cost for those having a single track, has been estimated at $22,000, equivalent to £4,166 sterling, per mile. For the double track $32,000, or £6,666 sterling per mile.

But the extreme differences which are to be observed in the cost of construction in the various States are so great, ranging from £1,600 up to £24,000 per mile, that no criterion can be established from averages obtained from such discordant data.

The State of Massachusetts affords the best materials for accurate information.

All the railroad corporations are by law obliged to make annual returns to the Legislature, and very valuable statistical information is thereby obtained upon railway affairs.

From the Official Reports for the year 1847, the following table has been compiled:—

# RAILROADS IN THE STATE OF MASSACHUSETTS.

| Name of Road. | Length of Road in Miles. | Total Cost of Road and Equipment. | Cost per Mile. | Form of Rail, and lbs. per yard. | Miles of Single Rail. | Miles of Double Rail. | Dividend for 1847. | Cost per Mile of Single Track, Sterling. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | | $ | $ | m. lbs. | | | | £ | |
| Boston and Lowell | 26 | 1,956,719 | 75,258 | H 1¼ 45 / 20 56 / 3¼ 63 | None | 26 | 8 | 7,830 | |
| Boston and Maine | 73 | 3,021,172 | 41,385 | H 6m. 45 lbs. rest 45 to 60. | 68 | 5 | 9 | 8,069 | |
| Boston and Providence | 48 | 2,545,715 | 53,014 | T 56 to 58. | 32¼ | 15¾ | 7½ | 8,316 | |
| Boston and Worcester | 44½ / 14 | 4,113,609 | 70,318 | T or H 60 to 64. | 14 | 44½ | 8 | 7,583 | Including Branches. |
| Connecticut River | 36 / 2 | 1,167,156 | 30,714 | H 56 lbs. | 38 | None | 7 | 6,399 | do |
| Eastern | 38 / 20 | 2,937,206 | 50,641 | H and Chair lbs. 57 / 46 | 42 | 16 | 8 | 8,269 | do |
| Fall River | 42 | 1,070,988 | 25,499 | H 52 to 56 | 42 | None | ..... | 5,312 | |
| Fitchburgh | 49½ / 2 | 2,406,723 | 46,732 | T 56 lbs. | 46¼ | 5¼ | 10 | 8,835 | do |
| Lexington and W. Cambridge | 6½ | 221,309 | 34,047 | 56 lbs. | 6½ | None | | 7,093 | |
| Nashau and Lowell | 14¼ | 500,000 | 35,087 | T 56 lbs. | 1¼ | 13 | 10 | 3,822 | |
| New Bedford and Taunton | 20 / 1 | 483,882 | 23,042 | 56 lbs. | 21 | None | 8 | 4,800 | do |
| Norwich and Worcester | 59 / 7 | 2,187,249 | 33,140 | T 56 lbs. | 64¼ | 1¾ | ..... | 6,725 | do |
| Old Colony | 37 / 7 | 1,636,632 | 37,196 | H 56 lbs. | 44 | None | 6¼ | 7,749 | do |
| Pittsfield and N. Adams | 19 | 446,353 | 23,492 | H 56 lbs. | 19 | None | ..... | 4,894 | |
| Western | 118 | 6,982,233 | 59,171 | 56½ to 70 | 99 | 19 | .. ..... | 10,617 | |
| Total | 683¾ / 146¼ | 31,675,946 | ..... | ..... | 146½ | ..... | ..... | *7,950 | |
| Single Track | 830 | | | | | | | | |

* Average for Single Track per Mile.

This table comprises, with the exception of about fifty miles, upon which there occur some doubts as to what the account precisely embraces, the whole of the Railroads at present completed in the State of Massachusetts. The table shows 683½ miles of railway, including branches, which have cost in their construction and equipment, $31,675,946, or £6,599,155 sterling.

There are 146 miles of double track. They have been taken at so much additional single track. A double track would not cost exactly twice that of a single one in its construction ; but as these lines were made originally only with single tracks, and have been added to from time to time as circumstances would admit, it must have tended to increase the cost, and in calculating the average expense per mile, it is considered the result will not be much in error. The cost per mile, it appears then, has been £7,950 sterling.

There is no other State in the Union which presents equally good data for making an approximate estimate.

The climate and nature of the country bears also strong resemblance to that through which the Halifax and Quebec line will pass, and in this respect the analogy of the two cases is extremely favorable.

The New York and Erie Railroad, 450 miles in length, now in course of construction, will, it is supposed from the latest information, cost £6,250 per mile, exclusive of equipment.

The estimate for the Hudson River from New York to Albany, now in progress, is for the single track, £7,440 sterling per mile.

The estimate for the Montreal and Portland line is about £5,080 sterling per mile.

For the Great Western Railroad in progress in Upper Canada, the estimate for that section of the line which would most resemble the Halifax and Quebec Road, is £5,638 per mile.

On referring to the table, it will be seen that all the lines have either the H or T rail, generally 56lbs to the yard.

The price of railroad iron in the States is very much greater than in England, or what it can be procured for in the British Provinces. It pays a very high duty on importation into the States.

On some of the lines upwards of £15 per ton for rails has been paid. In England rails can now be bought for £8 or £9 per ton.

The advantage which the Halifax and Quebec line will possess over the lines in the table in respect of iron alone, may be estimated at £500 per mile.

When these lines were constructed also, the demand for labour was extremely great, and wages much higher than in the present day.

The average (of £7,950) derived from the table, may therefore very fairly be reduced by several hundred pounds.

The Halifax and Quebec line will have also many advantages which the American lines had not.

The land for the greater portion of the road will not have to be purchased. Timber and stone will be had nearly along the whole line for the labour of cutting and quarrying.

Judging then from the analogy afforded by a similar, or nearly similar, lines in the neighbouring States, giving due weight to the considerations which have a tendency to modify the cost in the particular case of the Halifax and Quebec line, and forming the best estimate to be derived from the data obtained upon the exploratory survey, which under the circumstances of a perfectly new country, only recently explored, and still covered with a dense forest, is all that can in the first instance be done; it is considered that if the sum of £7,000 sterling per mile be assumed as the probable cost of the proposed line, it will not be far from the correct amount.

The total distance from Halifax to Quebec will be about 635 miles.

| | |
|---|---|
| 635 miles, £7,000 per mile, will be..... ..... | £4,445,000 |
| Add one-tenth for contingencies..... | 444,500 |
| | £4,889,500 |

Or, in round numbers, five millions.

It is estimated, therefore, that the cost for construction and equipment of the Proposed Trunk Line, from Halifax, through New Brunswick, to Quebec, will amount to £5,000,000 sterling.

---

The question which presents itself next for consideration is a very important one, namely, the probable returns for such an expenditure.

The information to be afforded on this head can only to be derived in a very general way, from a consideration of the present population and resources of the three Provinces.

The direct communication between the two termini, Halifax and Quebec, is of a very limited nature.

By land, it is confined almost to the conveyance of the mails. Passengers proceed generally by the way of the United States.

By sea, in 1847, the communication was by seventeen vessels, which arrived at Quebec, having a tonnage of 1,257, and eighteen departed from that port for Halifax, whose tonnage amounted to 1,386 tons.

This amount of intercourse does not at the first view appear encouraging to expect receipts, but when it is made to appear that this limited intercourse arises *entirely* from the want of good means of inter-communication, such as would be afforded by the proposed railway, it becomes a strong argument in favor of making the line, rather than against it.

The communication of the Provinces with each other is cramped and restricted beyond measure by the same want.

By sea the amount of intercourse may be judged of by the return given in Appendix No. 6, furnished by the Quebec Board of Trade.

The chief elements which enter into, and upon which depends, the success of every railway enterprise, are population, agriculture and commerce.

At the extremities of the line, and for some miles along the St. Lawrence, there is an abundant population. External commerce, there is in an eminent degree. In that of agriculture its deficiency is great at present, but as there are millions of acres of good productive land only waiting for the hands necessary to cultivate them, and the means of access to which will be afforded by the railway, this very circumstance may be made to conduce to the advantage of the line, and pay a large portion of the expense of its construction.

The population of Halifax (the Atlantic terminus) is estimated at 25,000 souls. It is the capital of the Province, the seat of Government, and its commerce extensive. The value of its imports and exports is estimated at £2,500,000.

The City of Quebec, the other terminus, according to the census of 1844, contained (including the county, which is not given separately) 45,000 persons.

But this city derives additional importance from its being the one great shipping port and outlet for all Canada. By its port passes the whole trade of that Province. It may be regarded as the focus of commerce for a million and a half of souls. The value of the imports and exports together may be estimated at £5,500,000 sterling, giving employment to a very great amount of shipping.

This immense trade is of necessity crowded into six months, the navigation of the St. Lawrence being closed for the remainder of the year.

In addition to these two great termini there are lying on each side of the line two most important tributaries, viz., the City of St. John and Prince Edward's Island. The former with a population in city and county together, of nearly 44,000 persons, with a commerce of the value of £1,800,000 in exports and imports, giving employment also to a great amount of shipping. The latter with a population of 50,000 engaged principally in agriculture and the fisheries. The exports and imports of this island are about £200,000 annually.

Between the City of Quebec and the River Métis there are, settled along the south bank of the St. Lawrence, 75,000 inhabitants, all engaged in agriculture. These people are French Canadians, and almost every family has a small farm and homestead.

A striking peculiarity of these farms are their elongated shape, the length being generally thirty times that of the breadth, oftentimes a greater disproportion exists. The houses and farm-buildings are always built at one extremity, that which adjoins the road

dividing one set of concessions from another. There are generally three or four lines of houses and roads running thus along the St. Lawrence.

The effect produced by this manner of parcelling out the land and building has been to *form* what can only be compared to one long and continued village for 200 miles.

For the first 100 miles out of Quebec, as far nearly as the Rivière du Loup, the proposed line of railway will run through the centre of this extended village, and with a train of moderate length, the last carriage will scarcely have cleared the door of one house before the engine will be opposite another. For the second 100 miles it will leave these concessions and farms a little on one side, but still within reach. A more favorable disposition of a population (comprised of small farmers) for contributing to the *way traffic* of a railroad could scarcely have been devised.

In the country lying between the Restigouche River and Halifax, the inhabitants who will be near to the railroad will amount to about 100,000; making the population, either upon or near to the line, including the two termini, 250,000 persons. But if the *total* population be taken within the area, which will be benefited *by* and become contributors to the line, then it may be estimated at not less than 400,000 souls.

In a Report of the Directors, made upon the New York and Erie Railroad in 1843, when the question of proceeding with that line was under consideration, one of the data upon which its future receipts was calculated was derived from population and relative distance. And using the data obtained from the working of one portion which had been completed and was in operation, it was calculated that 531,000 persons on a line of 425 miles in length, would return in *net* earnings to the railway $1,343,500, or $2.50 nearly per head, equivalent to ten shillings sterling. As the railroad is not yet completed, the true result cannot yet be seen.

The net earnings of the railroads in Massachusetts for the year 1847 were $2,290,000. The population of that State, over whose area railways are everywhere extended, and the whole of which may therefore be considered as tributary to them, being at the time about 800,000. This gives $2.75 per head, equivalent to eleven shillings, or the same result nearly.

Applying the same ratio (of ten shillings per head) to the 400,000 inhabitants who are within the area, and likely to become tributaries to the Quebec and Halifax Railway, it would give £200,000 as its probable revenue.

The great staple of trade of New Brunswick is its timber. For this all absorbing pursuit the inhabitants neglect agriculture, and instead of raising their own supplies they import provisions in large quantities from Canada and the United States. In the year 1846, New Brunswick paid to the latter for provisions alone £216,000 sterling, whilst, in return, the United States only took from them £11,000 in coals and fish.

Of Nova Scotia the great staples are timber and the products of the fisheries. The inhabitants import provisions also largely.

Canada is an *exporting* country, and capable of supplying the demands of both.

In the winter of 1847-8 the price of flour at Halifax and St. John was at forty shillings the barrel, and it was being imported from the chief ports in the United States, even from as far as New Orleans in the Gulf of Mexico. At the same time, at Quebec the price of flour was only twenty-five shillings per barrel. A very great difference, which, had the railroad been in existence, would not have occurred.

Another great source of revenue likely to be developed by the railway is that of coals, to be derived from the great Cumberland Field.

Quebec and the upper country would no doubt take large quantities for their own consumption. Halifax the same for itself, and also for exportation to the United States.

Considerable returns would arise from the fisheries and from the products of the forest, lying contiguous to the line, which would find their way by it to the shipping ports.

The country through which the road will pass possesses, therefore, *in itself*, elements which, when fully developed, cannot fail to realize large receipts.

But there are, exclusive of these, other and highly important sources for productive revenue.

Halifax may be considered to be the nearest great sea-port to Europe.

Passengers travelling between England and the Canadas would adopt this railway, as the shortest and best line which they could take. Emigrants would do the same.

The mails, troops, munitions of war, commissariat supplies and all public stores, would naturally pass by it, as the safest, speediest and cheapest means of conveyance.

If a straight line be drawn from Cape Clear in Ireland, to New York, it will cut through or pass close to Halifax.

The latter is therefore on the direct route; and as the sea voyage across the Atlantic to New York may be shortened by three days nearly, in steamers, it is not improbable that on that account, when the branch railroad to St. John is completed, and other line to connect on with those in the United States, the whole or the greatest portion of the passenger traffic between the Old and the New World would pass through Halifax, and over a great section of the proposed railroad.

But the great object for the railway to attain, and which, if it should be able to accomplish, its capability to pay the interest of the capital expended would be undoubted, is to supersede the long and dangerous passage to Quebec by the Gulf of St. Lawrence.

To make *two* voyages in a season vessels are obliged to leave England earlier, and encounter the dangers of the ice in the Gulf, much sooner than it is safe or prudent for them to do.

The loss of life and property which has occurred from this cause, and returning late in the autumn, has been enormous. It cannot be ascertained, but probably it would have more than paid for the railway.

An opinion, may, however, be formed of it from the rates of insurance, which in the spring and autumn are as high as ten per cent. A much higher rate than to any other part of the world.

The navigation of the St. Lawrence is closed for about six months of every year. During the whole of this period all the produce of the country is locked up, and necessarily lies unproductive on the hands of the holders.

The surplus agricultural produce of the year cannot be got ready to be shipped in the season it is produced. In the winter of 1846–7 it has been stated on good authority, that 500,000 barrels of flour were detained in Montreal at the time when famine was raging in Ireland. As soon as the season opened, there was such a demand for shipping to carry provisions, that the ordinary course of the timber trade was deranged by it.

All this would have been prevented had the railway been then in existence.

For six months in the year, then, the St. Lawrence would cease to be a competitor with the railway, and large quantities of produce would be certain to be forwarded by it.

For the other six months of the year it would have also the following strong claims to preference:—rapidity of transport; the saving of heavy insurance; cheaper rate of freight from Halifax; vessels engaged in the Canadian trade could make *three* voyages to Halifax for *two* to Quebec.

The trade which is now crowded into six months, to the great inconvenience of every one concerned, rendering large stocks necessary to be kept on hand, would be diffused equally over the whole year.

It is most probable that these advantages will be found so great, that only the bulky and weighty articles of commerce, such as the very heavy timber and a few other goods, will continue to be sent round by the Gulf of St. Lawrence.

If such should prove to be the case, then the proposed railway would have as much or perhaps more traffic than a single track could accommodate.

The cost of transportation, it is calculated, will not be too high on this line to admit of the above results being realized, and in that case, more especially if the capital can be raised at a moderate rate of interest, it is considered highly probable that it will, even in a commercial point of view, be a profitable undertaking.

From evidence given to the Gauge Commissioners in England, it appears that the *cost* of transport for goods on the undermentioned lines of railway was as follows:—

| | | | |
|---|---|---|---|
| Great Western | .06 | of a penny | per ton per mile. |
| Grand Junction | .13 | " | " |
| Birmingham and Gloucester | .09 | " | " |
| South Western | .10 | " | " |
| London and Birmingham | .12 | " | " |
| | 5).50 | | |
| | .10 | Average per ton per mile. | |

This is supposed to be gross weight, including carriages, &c.

One-fifth of a penny per mile per ton will be a liberal allowance for the net weight.

From a very carefully prepared document,* extracted from a Report of the Commissioners appointed in 1846 by the Legislature of the State of New York, to locate certain portions of the New York and Erie Railroad, it appears that the cost of motive power on some of the principal railroads in the United States was 40 cents per train per mile, equivalent to 1*s.* 8*d.* sterling.

With the expected grades on the Halifax and Quebec line, it is calculated that an engine of good power, having the assistance of an extra engine for 25 miles of the distance, will convey 100 tons of goods at a moderate speed of eight to ten miles an hour over the whole line.

| The total cost per train would then be— | £ | *s.* | *d.* |
|---|---|---|---|
| 635 miles, at 1*s.* 8*d.* per mile | 52 | 18 | 4 |
| 25 miles, at 1*s.* 8*d.* for extra engine | 2 | 1 | 8 |
| Total for 100 tons | £55 | 0 | 0 |

Or 11*s.* per ton for the whole distance. Equal to .207 drs. per ton per mile, the same nearly as the average on the English railways.

At this rate, the *actual* cost of carrying a barrel of flour from Quebec to Halifax will be only 1*s.* 1*d.*; and if it be doubled to pay interest on capital, then 2*s.* 2*d.* might be the price charged for its conveyance.

The freight of flour from Quebec to England may be taken at 5*s.* per barrel; from Halifax at 3*s.*

The difference in freight would therefore pay its transit by railway, and the difference in the rates of insurance would be to the profit of the owner; and the voyage being shorter, there would be less risk of its arrival in the market in a heated or deteriorated condition.

Provisions and all other articles whose value is great in proportion to their bulk, would be as advantageously forwarded by this route.

It is fully expected, therefore, that the railway will be able to compete successfully with the shipping in the St. Lawrence even during the summer season.

But there is still another great and important source from which traffic may be expected, viz.:—From those vast and extensive regions in the Far West, round the Lakes Huron, Michigan, and Lake Superior.

By the completion of the canals along the River St. Lawrence, the produce of these lake countries now finds its way to the markets of Montreal and Quebec.

Large cargoes, consisting of 3,000 barrels of flour, can now pass from their ports down to Quebec without once breaking bulk.

Already produce which found its way to New York by the circuitous route of the Mississippi and New Orleans, has been diverted to the channel of the St. Lawrence.

The extent to which this will take place it is not possible yet to calculate; but there is no doubt that large quantities of produce which formerly found its way to the Atlantic ports of New York and Boston, will be diverted to the St. Lawrence.

Of the enormous exports of provisions from the United States, the following will give some idea:—

| | In 1846. | In 1847. |
|---|---|---|
| Flour —barrels | 2,289,476 | 4,382,496 |
| Wheat—bushels | 1,613,795 | 4,399,951 |
| Corn —bushels | 1,826,068 | 16,326,050 |
| Meal —barrels | 293,720 | 918,066 |

The great portion, if not nearly all this immense produce, of which the above forms only a *few items* in the *great account*, was received at the Atlantic Ports from the Far West. And it is for this most important and still increasing trade, that Montreal and Quebec will now, by means of the St. Lawrence Canals, have the most favorable chance of a successful competition with new York and Boston.

*Vide Appendix No. 7.

It has been calculated that the cost of transport for a barrel of flour from the lakes to New York was 5*s.* 1*d.* sterling; to Boston 6*s.*, exclusive of charges for transshipment.

By the Quebec and Halifax line, it is estimated, now that the Canals are open, a barrel of flour may be delivered at Quebec for 2*s.* sterling, and carried to Halifax for 2*s.* 2*d.*; total, 4*s.* 2*d.*

By the Montreal and Portland, 1*s.* 8*d.* has been estimated as the price per the railway, to which if 2*s.* more be added as freight to Montreal, the price by that line will probably be only 3*s.* 8*d.* sterling per barrel. The Montreal and Portland will have, therefore, an apparent advantage over the Quebec and Halifax line, arising from its much shorter distance. But there are some drawbacks attending it, which may cause the preference to be given to the latter notwithstanding the line passes through the United States.

A transit duty of 2½ per cent. *ad valorem* has to be levied upon all foreign produce, and introduces the inconvenience of custom-houses and custom-house officers.

Portland is a foreign port, and is 400 miles by sea farther from England than Halifax.

It has been seen in a former part of this Report, when speaking of the Utica and Syracuse Railroad, how inadequate that line was to take all the traffic which was required to be forwarded by it at the time the Erie Canal is closed.

The growing population and produce of the Western States are so gigantic, that it is probable there will be more than sufficient to employ fully *both* the Montreal and Portland, and Quebec and Halifax Railroads.

---

From the foregoing remarks, it will appear then, that although no very good or precise estimate of the returns for the expenditure of five millions sterling can be given, yet that there are very good general grounds upon which to form an opinion, that ultimately, if not at once, the line will, in a commercial point of view, be a very productive one.

The Montreal and Portland, which will be the great competitor with that of the Quebec and Halifax line, is an enterprise of a purely commercial and *local* nature. As such, it is not likely shareholders will be contented, unless they receive what they have every right to expect—a high rate of interest for the expenditure they have incurred, and the risk they have encountered in the undertaking.

But with the Quebec and Halifax it is very different. The enterprise is of *general interest*. It concerns the prosperity and welfare of each of the three Provinces, and the honor as well as the interests of the whole British Empire may be affected by it. It is the *one* great means by which alone the power of the Mother Country can be brought to bear on this side of the Atlantic, and restore the balance of power now fast turning to the side of the United States.

Every new line of railway made in that country adds to their power, enabling them to concentrate their forces almost wherever they please, and by the lines, of which there are already some, and there will soon be more, reaching to their northern frontier, they can choose at their own time any one point of attack on the long-extended Canadian frontier, and direct their whole strength against it.

The Provinces, therefore, and the Empire, having such interest in the formation of the Halifax and Quebec line, it should be undertaken by them in common as a great public work for the public weal.

If so undertaken, the Provinces, supported by the credit of the Mother Country, could raise capital at a rate of interest which could not be done by any Company of Shareholders. And if to this advantage be added the disposal for the exclusive benefit of the railway, of a portion of the wild lands along the line, and in the immediate country which it would be the means of opening to settlement and cultivation, then it is highly probable that it would be constructed for three millions sterling.

In a former part of this Report it has been estimated that there are in the counties through which this line will pass, fourteen millions of acres of land yet ungranted, and therefore remaining at the disposal of the Provincial Government.

The ordinary price of an acre of wild or uncleared land is about 2*s.* 6*d.* to 3*s.* per acre. But where public roads are made through them, the value immediately increases, and it will not be considered an extravagant estimate, to suppose that the land along it, or in the immediate vicinity of the railway, will be worth £1 per acre.

For the construction of the great St. Lawrence Canal, by which Canada has now the prospect of reaping such immense advantages from the trade of the western country, the Imperial Government guaranteed the interest on a loan of two millions sterling and upwards at four per cent. This loan was easily raised, and a large premium per cent. was received in addition for it.

There can be little doubt that another loan of three millions sterling, at the same rate of four per cent. interest, could be raised upon the credit of the Provincial revenues if guaranteed by the Mother Country. With this amount of capital, and two millions of acres to be reserved, and sold from time to time, it is conceived the railway may be made.

Upon the strength of these two millions of acres, and the loan as a basis, a large amount of *notes* might be issued in payment of the wages and salaries of the labourers and other persons employed on the works of the railway. They should be made receivable for taxes and customs duties. The amount authorized to be issued might be limited to the extent of the acres, and as these were sold, an equal amount of the notes should be cancelled.

The issue of a number of notes which would pass current over the three Provinces, would be conferring a great benefit upon the community at large. The currency is not the same throughout, and persons who travel from one Province to another are now put to inconvenience, and have often to pay a discount upon exchanging the notes of one colonial bank for those of another. Advantage might be taken of the measure to assimilate the currency of the colonies to each other, and make it "sterling," the same as in England.

By a little arrangement, also, these notes might be made payable at the chief ports of emigration in the United Kingdom; and in that case a very great convenience would be afforded to a large class of persons on both sides of the Atlantic.

To remit small sums now, requires the intervention of bankers or agents. This has the effect upon persons resident in the settlements (and no doubt, also, often in towns), of preventing their sending the assistance which they otherwise would do to friends at home. Many a small note would be put up and sent in a letter, which is now never thought of for want of the convenience.

In remitting sums from Halifax to England, the banks do not like to give bills at less than sixty days' sight. These notes would, therefore, become a great public benefit, and there would be no fear of their being kept in circulation almost to any amount.

Upon the loan of three millions, the interst at four per cent. would amount to £120,000 per annum.

Of this sum it may be fairly assumed that for the conveyance of the mails between Halifax and Quebec, the Post Office Department would be willing to pay annually an equal amount to what is now paid for the same service. This has not been officially obtained, but there are good grounds for supposing that it is nearly £20,000.

In the case, then, that beyond this the railway only paid its own working expenses, the sum of £100,000 would have to be made good out of the revenues of the Provinces.

The proportion of this, or of whatever sum might be deficient to pay the interest on the loan, would have to be arranged; and it may, for the sake of illustration, be supposed to be as follows:—

| | | | |
|---|---|---|---|
| Nova Scotia | £20,000 | Proportion | .2 |
| New Brunswick | 20,000 | " | .2 |
| Canada | 30,000 | " | .3 |
| The Imperial Government | 30,000 | " | .3 |
| Total | £100,000 | | .10 |

For the proportion guaranteed by the Provinces, they would receive the benefits conferred by the railway in developing their resources, increasing the value of all property, promoting the sale and settlement of their wild lands, increased population, and increased revenue.

For the proportion guaranteed by the Imperial Government, all Government officers, civil or military, troops, munitions of war, supplies, &c., for the public service, and *emigrants*, should be transported over the line at the cost price.

New Brunswick and Nova Scotia, it is understood, are most willing to guarantee the interest to the extent of their means, and in a fair proportion.

Canada having done so much already for the communications above Montreal, it is fully expected will not be backward in perfecting those below Quebec.

In the extreme case supposed above, viz., of the railway yielding no returns beyond working expenses, it is not conceived that either one of the Provinces or the Empire would not receive an equivalent in some other form for its direct contribution to make good the interest.

An account is at present being taken of the existing way traffic between Halifax and Amherst, by the Commissioner appointed by Nova Scotia to collect statistics for the railway. The same is being done for that portion of the line along the banks of the St. Lawrence.

There is some reason to believe that these two portions of the line will be found to have sufficient traffic to pay, over and above working expenses, the moderate interest on capital of four per cent.

If such should prove to be correct, then the foregoing statement would be modified and stand thus:—

| | | Miles. |
|---|---|---|
| Total distance, Halifax to Quebec | | 635 |
| Quebec to River du Loup | 110 | |
| Halifax to Amherst and Bay Verte | 125 | |
| | | 235 |
| Leaving unproductive still | | 400 |

If the total line can be done for £3,000,000, then the proportion for the 400 miles would be £1,889,600 or £2,000,000 nearly.

The interest for which would amount to £80,000.

Deducting £20,000 for the conveyance of the mails, then the sum to be responsible for would be £60,000, which divided proportionally as before, would give for

| | | | |
|---|---|---|---|
| Nova Scotia | £12,000 | proportion | .2 |
| New Brunswick | 12,000 | " | .2 |
| Canada | 18,000 | " | .3 |
| Great Britain | 18,000 | " | .3 |
| Total | £60,000 | | .10 |

Therefore, for the responsibility (perhaps for *assuming it only*) of £100,000, or as the case may prove, £60,000, the Quebec and Halifax Railway may be made.

But to look at this great work only as a commercial speculation, and as yielding mere interest for the expenditure incurred, would be to take a very limited view of the objects it is capable of achieving.

In the United States they are well aware of the increased value which internal improvements and communications give to property of every kind.

In those countries works have been undertaken for that object alone, not for the mere return which the work, whether railway, road or canal, would make of itself.

The indebtedness of the several States has been incurred almost entirely in making great internal improvements. And in the boldness and unhesitating way in which they have incurred debts and responsibilities for the purpose of developing their resources, may be seen the secret of their unrivalled prosperity.

The State is in debt, but its citizens have been enriched beyond all proportion.

Most unfavorable comparisons are made by travellers who visit the British Provinces and the United States. And some have gone so far as to state, that travelling along where the boundary is a mere conventional line, they could at once tell whether they were in the States or not.

On the one side the State Governments become shareholders to a large amount in great public works, *lead* the way and do not hesitate to incur debt, for making what has been termed "war upon the wilderness;" employment is given, and by the time the improvement is completed property has been created and the *employed* become proprietors.

On the other side the Provincial Governments do not take the initiative in the same manner, and hence in the settlements and in the provinces generally, may be seen this marked difference in the progress of people who are identically the same in every respect.

Until the British Provinces boldly imitate the policy of the States in this regard, and make "war upon their wilderness," their progress will continue to present the same unfavorable contrast.

The creative or productive power of canals, railways, &c., may be traced in the history and progress of the State of New York.

The Erie Canal was commenced in 1817, and completed in 1825, at a cost of $7,143,789, £1,400,000 sterling. In 1817 the value of real and personal property in the City of New York, was from official documents estimated at £16,436,000 sterling. In 1825, it was estimated at £21,075,000 sterling. In 1829, the population of the State was 1,372,000, and in 1830 the population of the State was 1,918,000.

The canal was found so inadequate to the traffic, that between the years 1825 and 1835, a farther sum of £2,700,000 was expended in enlarging it.

Making the total cost to that date, £4,100,000 sterling.

It has been seen that in the City of New York—

| | |
|---|---|
| In 1817, the official value of real and personal property was... | £16,436,000 |
| In 1835, " " " " ... | 45,567,000 |

Being an increase of 2¾ times in eighteen years.

For the State of New York—

| | |
|---|---|
| In 1817, the official value of real and personal property was.. | £ 63,368,000 |
| In 1835, " " " " .. | 110,120,000 |

Or an increase of nearly £47,000,000 sterling in the value of property, attributed chiefly, if not entirely, to the formation of the canals.

In 1836, the amount conveyed to tide water by the canal was 697,357 tons.

And on the first of July of that year there had accumulated in the hands of the Commissioners an amount sufficient to extinguish the whole of the outstanding debt incurred in its construction.

The net receipts from all the State canals, after deducting the expenses of collection and superintendence, for the year 1847, was £449,270. Villages, towns, and cities have sprung up along its course.

The population of the State, which was—

| | |
|---|---|
| In 1810..... | 959,949 |
| Was in 1845 ..... | 2,604,495 |

In 1846 the value of real and personal property was estimated at £128,500,000.

It will be seen from the above, therefore, that in addition to the wealth created for individuals, the canals produce a large annual revenue to the State.

The following extracts from the financial affairs and statistics of some of the States may be quoted in illustration of this part of the subject:—

1847.

*Massachusetts.*

| | |
|---|---|
| Total indebtedness of the State 1st January, 1847..... | $ 999,654 |
| Credit of the *State*, *lent* to Railroads..... ..... | 5,049,555 |
| Total liabilities of the State..... | $6,049,209 |

As security for the redemption of the scrip *lent* to Railroads, the Commonwealth holds a mortgage on all the roads, and also 3,000 shares in the Norwich and Worcester, and 1,000 in the Andover and Haverhill.

*Pennsylvania.*

| | |
|---|---|
| Public property, canals and railroads, at original cost..... | $28,657,432 |

*Maryland.*

| | |
|---|---|
| Receipts from Baltimore and Ohio Railroad..... | $42,402 |
| Ditto from Canal Company..... | 11,550 |

*North Carolina.*

Debt of the State, on account of Railroad Companies..... $1,110,000

*Ohio.*

| | |
|---|---|
| Debt contracted for the sole purpose of the construction of Public Works within the State..... | $19,246,000 |
| Canals, 820 miles in length, cost ..... | 15,122,503 |
| Net receipts in 1846, after paying repairs and expenses..... | 408,916 |
| In 1810 the population of this State was..... | 45,865 |
| In 1820 " " ..... | 581,434 |
| In 1840 " " ..... | 1,519,467 |

or tripled nearly in twenty years, during the progress of her canals.

*Michigan.*

Debt on 30th November, 1845..... $4,394,510

Total length of Railroads finished, and *belonging* to the *State*, 222 mills.
This State was authorized to raise a loan of $5,000,000 for *internal improvements*.
For the same purpose, Congress granted to this State 500,000 acres of land.

| | |
|---|---|
| In 1840, the population was..... | 212,267 |
| In 1845, " ..... | 304,278 |

or an increase of fifty per cent. nearly in *five* years.

*Indiana.*

1st January, 1847, the public debt was..... $14,394,940

By the terms of the Act adjusting this debt, it is to be equally divided between the State and the Wabash and Erie Canal. Of this canal, which is to be 458 miles long, 374 miles are in Indiana; 174 of this portion are finished, and in operation. There remain 200 miles to be completed, upon which part about $1,200,000 have been expended by the State. It is estimated to cost the further sum of $2,000,000 to complete the entire canal. To cover this amount, the State is to transfer to trustees 963,126 acres of land adjoining to or in the neighbourhood of the canal.

| | |
|---|---|
| The population of this State in 1811 was..... ..... | 24,520 |
| " " " 1830 " ..... | 343,031 |
| " " " 1840 " ..... | 685,086 |

or doubled in ten years.

*Illinois.*

| | |
|---|---|
| 1847.—Total internal improvement debt..... | $8,165,081 |
| Total canal debt..... | 6,009,187 |
| | $14,174,268 |
| The population in 1830 was..... | 157,455 |
| " " 1840 " ..... | 476,183 |

*or tripled in ten years.*

| | |
|---|---|
| The sales of the public lands during one year (1845) in the United States amounted to..... Acres, | 1,843,527 |
| Producing..... | $2,470,298 |

or an average of *5s. 7d.* sterling per acre.

But to shew the effect produced by a canal or railway passing through property, the following extract may be quoted from the Report of a Board of Directors of the New York and Erie Railroad Company in February, 1844:—

"The Board find that they have omitted one description of property which has heretofore been considered of great value, but the right to most of which has been lost to the Company by failure to complete the road within a certain period; the most valuable

of which consisted of 50,000 acres of wild lands in Cattaraquas County, near Lake Erie, and one-fourth part of the Village of Dunkirk.

"An offer in writing was made in 1837, by responsible parties, to take these donations, and pay further the sum of $400,000, provided certain portions of the railroad were completed within a specified time."

That is about $8, or 33*s.* 4*d.* sterling per acre.

In Michigan 461,000 acres were granted by Congress for the endowment of a University. These lands were selected in sections from the most valuable of the State. The minimum price of these was at one time $20, or £4 6*s.* 8*d.* sterling per acre, but became lower afterwards; 17,142 acres, the quantity sold up to 30th November, 1845, brought £2 9*s.* per acre.

Sixty-nine thousand acres, devoted to schools, were sold for £1 7*s.* per acre.

Such, then, are some of the results of making "war upon the wilderness."

In New Brunswick there are, according to an Official Report of the Surveyor General, dated 15th December, 1847, 20,000,000 acres, of which about 6,000,000 are either granted or sold, and 3,000,000 may be considered as barren or under water; leaving, therefore, at the disposal of the Government, 11,000,000 of acres of forest land fit for settlement.

Of the 6,000,000 granted or sold, only 600,000 acres are estimated at being actually under cultivation.

By a statistical table published by W. Spackman, London, there are—

| | Acres Cultivated. | Acres Uncultivated. | Acres Unprofitable. | Total Acres. |
|---|---|---|---|---|
| In England | 25,632,000 | 3,454,000 | 3,256,400 | 32,342,000 |
| Wales | 3,117,000 | 530,000 | 1,105,000 | 4,752,000 |
| Scotland | 5,265,000 | 5,950,000 | 8,523,930 | 19,738,000 |
| Ireland | 12,125,280 | 4,900,000 | 2,416,664 | 19,441,944 |
| New Brunswick | 600,000 | 16,400,000 | 3,000,000 | 20,000,000 |

| | | |
|---|---|---|
| Population of | England | 14,995,508 |
| " | Wales | 911,321 |
| " | Scotland | 2,628,957 |
| " | Ireland | 8,205,382 |
| " | New Brunswick | 208,000 |

In Ireland there appears to be from the above table, 17,000,000 acres of ground fit for cultivation, and it has a population of 8,000,000 to support.

In New Brunswick there is an *equal amount* of ground to cultivate, and it has only a population of 208,000 persons.

If the land yet uncleared and fit for cultivation be added which remains in the northern section of Nova Scotia, and again between the boundary of New Brunswick and the River St. Lawrence to the east of Quebec, then there would be a quantity of nearly equal to that of England itself, supporting a population of 400,000 souls.

It is not too much then to say that between the Bay of Fundy and the St. Lawrence, in the country to be traversed by the proposed Railway, there is abundant room for all the surplus population of the Mother Country.

Of the climate, soil, and capabilities of New Brunswick, it is impossible to speak too highly.

There is not a country in the world so beautifully wooded and watered.

An inspection of the map will show that there is scarcely a section of it without its streams, from the running brook up to the navigable river. Two-thirds of its boundary are washed by the sea; the remainder is embraced by the large rivers—the St. John and Restigouche.

For beauty and richness of scenery this latter river and its branches are not surpassed by anything in Great Britain.

Its lakes are numerous, and most beautiful; its surface is undulating, hill and dale, varying up to mountain and valley. It is everywhere, except a few peaks of the highest mountains, covered with a dense forest of the finest growth.

The country can everywhere be penetrated by its streams.

In some parts of the interior, for a portage of three or four miles, a canoe can float away either to the Bay Chaleurs and the Gulf of St. Lawrence, or down to St. Johns, in the Bay of Fundy.

Its agricultural capabilities, its climate, &c., are described in Bouchette's works, in *Martin's British Colonies*, and other authors. The country is, by them, and most deservedly so, highly praised.

There may be mentioned, however, two drawbacks to it, and only two.

The winter is long and severe; and in summer there is the plague of flies.

The latter yield and disappear as the forest is cleared; how far the former may be modified by it experience only can show.

For any great plan of emigration or colonization, there is not another British Colony which presents such a favorable field for the trial as New Brunswick.

To 17,000,000 of productive acres there are only 208,000 inhabitants.

Of these 11,000,000 are still public property.

On the surface is an abundant stock of the finest timber, which in the markets of England realize large sums annually, and afford an unlimited supply of fuel to the settlers.

If these should ever become exhausted, there are the coal-fields underneath.

The rivers, lakes and sea-coasts abound with fish.

Along the Bay Chaleurs, it is so abundant that the land smells of it; it is used as manure, and while the olfactory senses of the traveller are offended by it on the land, he sees out at a sea immense shoals darkening the surface of the water.

For about the same expense five emigrants could be landed in New Brunswick for one in the Antipodes. Being within a fortnight by steam from London, any great plan of colonization could be directed and controlled by the Home Government.

In case of distress or failure, it would be long previously foreseen; the remedy or assistance could be applied; or, if beyond these, there would be the upper country and the Far West always open, and ready to receive the colonists.

The present limited population being so generally engaged in the pursuit of the timber trade and in the fisheries, there is the richest opening for agriculturists.

New Brunswick annually pays to the United States upwards of £200,000 for provisions and other articles which she can raise upon her own soil.

Nova Scotia does very nearly the same thing.

Whilst within a few miles' reach of their own capitals, there is abundance of land for agricultural productions; these two Provinces are *dependent* for large supplies of food upon the United States.

Flour is imported from as far as New Orleans.

Wheat grown in the valley of the Mississippi is shipped at St. Louis, and imported into New Brunswick; it is ground into flour at the mills of St. John, and furnishes a large share of the bread eaten by the labourers of that city.

There exists, therefore, a good market already on the spot for agricultural produce; and it would be a strange anomaly, indeed, if a country situated within three or four weeks' sail of the markets of England, could not compete with the growers of produce in the valley of the Mississippi and the counties round the great lakes in the Far West.

One thing, however, is greatly to be deprecated, that is any sudden or large emigration without previous preparation.

Before wheat or food of any kind can be grown the forest has to be removed, and that is a work of time and hard labour, during which those engaged in it must be fed from other sources.

With some little previous detailed surveying, the proposed railway can be commenced both at the Quebec and Halifax ends as soon as decided upon, and carried on for miles. During which time the further detailed survey necessary for the remainder of the line, and particularly the portion through the wilderness, might be made, and the line actually marked and cut throughout.

This line, when cut, would form a basis for laying out extensive blocks of land, and dividing them into allotments for settlers.

It will be unnecessary in this Report to recapitulate all the good effects produced upon every country in which railways have been established; but some may be mentioned,

They have become necessary to the age, and that country which has them not must fall behind in the onward march of improvement and in the development of its resources. And the longer it is suffered to do so, the greater and more unfavorable will be the contrast which it will present to the world.

Already in this respect the British Provinces of Nova Scotia and New Brunswick are far behind their enterprising neighbors.

One of the immediate effects of making this railway would be to place them in a position of equality. They are now *dependent* upon them for food.

At the closing of the navigation of the St. Lawrence, if the United States were merely to prohibit the exports of provisions from their own harbours, the consequences would be serious to these two Provinces. Canada could not then supply them.

In May, 1847, when the exploratory parties were being formed at Fredericton and provisions were being forwarded to the woods for their use, there was a scarcity of flour at St. John. It was said that sufficient for only two or three days' consumption remained in that city. The prices rose considerably, and the scarcity was only averted by the arrival of some cargoes from the United States, intended for Eastport.

The railway, had it been established, would have prevented such a state of things, and may save it for the future.

For the want of such a communication, Nova Scotia now finds it easier and more advantageous, notwithstanding a heavy duty of 20 per cent. against her, to export her great staple of fish to the States than to Canada; whereas, if the railway were made, it would pass on to the latter, where there would be an extensive market for it, and flour would be received in return.

Halifax would become the grand emporium of trade for the British provinces.

With the assistance of the electric telegraph, an order from Quebec could be received in a few minutes, and the articles wanted could be sent off by the next train.

As the vessels now arrive in fleets in the spring, and again in the autumn, it is a matter of forethought and consideratien to the merchant of Canada, to know what he shall provide himself with.

To the intending emigrant it will afford him the choice of any month in the year to set out for his new country, and if by means of friends previously settled, his place of abode has been chosen, he can time his arrival so as to have the shortest possible time to wait until his own crops are ready to supply him with food.

Arriving now, as thousands annually do, in the spring when the seed-time is at hand and the land uncleared, they lose the valuable opportunity of that year's crop, and have to wait over, existing, perhaps, upon their little capital for nearly eighteen months, until the succeeding harvest comes to them. To all such emigrants nearly a year may be saved.

Surprise has sometimes been expressed that out of so many who yearly land in the Provinces, so many pass on and become settlers in the States.

To the poor man his labour is his capital, and he must transfer himself to the place where employment is to be found.

The proposed railway would be such a work as would engage thousands in its immediate construction. While the stimulus and new spirit it would infuse into the whole community, now cribbed and confined as it were to their own locations, would give rise to branches and other works which would employ additional thousands.

It has been seen that the population of some of the Western States have doubled and even tripled themselves in the course of ten years.

The population of New Brunswick is now only 208,000. Her revenue in 1847 was £106,000 sterling, or 10*s.* per head.

There is no apparent reason why, if the same facilities of employment and land for settlement were afforded, that her progress should not be also very great.

Every emigrant, induced to settle and remain in the country, may be calculated as producing 10*s.* annual revenue to the Province.

If the formation of the railway increased the population of New Brunswick by 40,000 persons only, then her proportion of the guaranteed interest would be covered from that cause alone.

The same might occur also to Nova Scotia and Lower Canada.

It may be asked what is to become of the labourers employed upon the railway during

the winter. This is the season when lumbering or cutting of timber commences. They might engage in it also. But with the wages earned in the summer they should be incited to purchase small lots of ground of about fifty acres each.

The labours of the season over, or suspended upon the railway, they could most advantageously employ themselves in clearing, logging and improving their own lots. This they could do to such an extent that in the spring the women and older children could burn the logs off and put in some sort of crops for food, such as potatoes, Indian corn, &c.

Mechanics might either do the same, if railway work could not be found for them, or find employment in the towns.

Another great effect of the railway would be to enhance almost immediately the value of all real and personal property. The effects produced by the Erie Canal in doubling and nearly tripling that of the City of New York have been stated.

Villages and towns would, no doubt, spring up in its course the same as on the Canal. The railway would give them birth. Agriculture and external commerce would support and enrich them.

But if, by its means, the navigation of the Gulf of St. Lawrence is spared, what an amount of human suffering and loss of life will it not save.

The losses from shipwreck has been great, but not equal to that arising from protracted voyages and crowded emigrant ships.

In 1847, 89,738 persons emigrated to the British Provinces, of whom 5,293 persons perished at sea, and 10,000 are said to have died after their arrival.

This was a most unusual year, and it is to be hoped by every friend of humanity, that anything like it will never occur again.

No human means could have saved all this loss of life, but there is no doubt, a less protracted voyage and a more favorable time than the spring of the year in the St. Lawrence would have prevented some of the fatal results.

The railway established, the passage may be shortened, and the time of emigration may be selected at choice.

Troops are annually moved to and from Canada. About the close of the navigation in 1843, a transport, having the 1st Royal Regiment on board, was wrecked in the mouth of the St. Lawrence. The men got safely on shore, but there were no roads or means of getting away from the place. By the personal exertions of one of the officers, who made his way through the woods on snow shoes to the nearest settlements and thence to Quebec, information was given of the wreck, and a steamer sent down to take them off. But for this, the consequences must have been that the Regiment would have had to winter there in the best manner they could.

Embarking and disembarking at Halifax, all danger and inconvenience from the Gulf navigation would be avoided. Time and expense would be saved, and the season might be disregarded.

The mails to and from Canada could pass over British territory *exclusively*, and they would be received at Quebec before the steamer reached Boston, and at Montreal about the same time as it arrived at that port.

In a political and military point of view, the proposed railway must be regarded as becoming a *work of necessity*.

The increasing population and wealth of the United States, and the diffusion of railways over their territory, especially in the direction of the Canadian frontier, render it absolutely necessary to counterbalance, by some corresponding means, their otherwise preponderating power.

Their railway communications will enable them to select their own time and their own points of attack, and will impose upon the British the necessity of being prepared at *all points* to meet them.

It is most essential, therefore, that the Mother Country should be able to keep up her communications with the Canadas at all times and seasons. However powerful England may be at sea, no navy could save Canada from a land force.

Its conquest and annexation are freely spoken of in the United States, even on the floors of Congress.

*Weakness invites aggression*, and as the railway would be a lever of power by which

Great Britain could bring her strength to bear in the contest, it is not improbable that its construction would be the means of preventing a war at some no distant period.

The expenses of one year's war would pay for a railway two or three times over.

---

The following extract from the Report of Lord Durham, Her Majesty's High Commissioner and Governor General of British North America in 1839, is so apposite and just, and bears so strongly upon the subject under consideration, that it is conceived no better conclusion can be made to this Report than to insert it :—

"These interests are, indeed, of great magnitude; and on the course which Her Majesty and Your Parliament may adopt with respect to the North American Colonies, will depend the future destinies not only of the million and a half of Your Majesty's subjects who at present inhabit these Provinces, but of that vast population which those ample and fertile territories are fit and destined hereafter to support. No portion of the American Continent possesses greater natural resources for the maintenance of large and flourishing communities. An almost boundless range of the richest soil still remains unsettled, and may be rendered available for the purposes of agriculture. The wealth of inexhaustable forests of the best timber in America, and of extensive regions of the most valuable minerals, have as yet been scarcely touched. Along the whole line of sea-coast, around each island, and in every river, are to be found the greatest and richest fisheries in the world. The best fuel and the most abundant water-power are available for the coarser manufactures, for which an easy and certain market will be found. Trade with other Continents is favored by the possession of a large number of safe and spacious harbours; long, deep, and numerous rivers, and vast inland seas, supply the means of easy intercourse, and the structure of the country generally affords the utmost facility for every species of communication by land. Unbounded materials of agricultural, commercial, and manufacturing industry are there. It depends upon the present decision of the Imperial Legislature to determine for whose benefit they are to be rendered available. The country which has founded and maintained these Colonies at a vast expense of blood and treasure, may justly expect its compensation in turning their unappropriated resources to the account of its own redundant population; they are the rightful patrimony of the English people,—the ample appanage which God and nature have set aside in the New World, for those whose lot has assigned them but insufficient portions in the Old."

And if, for great political objects, it ever become necessary or advisable to unite all the British Provinces under one Legislative Government, then there will be formed on this side of the Atlantic one powerful British State, which, supported by the Imperial power of the Mother Country, may bid defiance to all the United States of America.

The means to the end, the first great step to its accomplishment, is the construction of the Halifax and Quebec Railway.

(Signed,) WM. ROBINSON,
*Captain, Royal Engineers, Brevet Major.*

Major-General Sir JOHN F. BURGOYNE, K.C.B.,
Inspector General of Fortifications,
&c., &c., &c.

August 31, 1848.

---

## LIST OF INCLOSURES TO MAJOR ROBINSON'S REPORT OF AUGUST 31, 1848.

Report on the Proposed Trunk Line of Railway from an Eastern Port in Nova Scotia, through New Brunswick, to Quebec, with seven Appendices.

Bound Book containing sixteen Exploratory Plans.

Printed Map of Nova Scotia, New Brunswick, and a portion of Lower Canada, showing the explored route, for the proposed Trunk Line of Railway from Halifax to Quebec.

Model Map.

General Section.

The foregoing relate to the line of railway recommended.

Plans Nos. 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, and 31, of a Line of Railway Reported upon.

# APPENDIX.

## APPENDIX NO. 1.

Plans referred to:—General Plan No. 1, Book of Plans 16, Detailed Plans, Nos. 25, 26, 27, 28, 29.

*Report on and Description of the Proposed Trunk Line of Railway from Halifax, through New Brunswick, to Quebec.*

The exploratory surveys which have been carried on during the years 1846–47, for the purpose of ascertaining the practicability of establishing a line of railway from the Atlantic shores of Nova Scotia, through the Province of New Brunswick, to the City of Quebec, on the River St. Lawrence, having resulted successfully, I have the honor to furnish you with a Report upon the line which has been found practicable, and which has fallen under my more immediate observation and direction.

The port of Halifax, in Nova Scotia, being selected as the Atlantic terminus of the railway, the chief difficulties to be surmounted between that port and the St. Lawrence have been ascertained, to be the range of highland in Nova Scotia, known as the Cobequid Hills, averaging from 800 to 1,000 feet in height; and two ranges of highlands, one of which, crossing the Province of New Brunswick from the River St. John, below the Grand Falls, in a north-easterly direction, rises to a considerable elevation at the head waters of the Rivers Tobique, Miramichi and Nepisiguit, and thence descends gradually to the shores of the Bay Chaleurs.

The other range, lying between the Rivers Restigouche and St. Lawrence, and nearly parallel to their general course, is very broken and lofty, some of the mountain ranges attaining an elevation of 3,000 feet above the sea.

Another obstacle of a general nature exists, and which increased the difficulty of ascertaining a practicable line through New Brunswick, inasmuch as the course of the line of railway is at right angles to the general course of the numerous rivers which intersect that Province.

The proposed line passes the first of these obstacles, the Cobequid Hills in Nova Scotia, about sixty-five miles from Halifax, by the valley of the Folly River, in the Township of Londonderry, attaining its summit level 600 feet above high water at Halifax, at the lake from which that river flows, being the lowest point on the hills to which there is a favorable approach which has been ascertained.

The line avoids the broken and lofty chain of highlands in New Brunswick by following the level shores of the Bay Chaleurs, and it ascends the range of highlands north of the Restigouche by the valley of the Metapediac River and the lakes at its head waters, by easy grades, attaining its summit level 760 feet above high water at a point about six miles north of the Great Metapediac Lake, from which it then descends along the valleys of different tributaries of the St. Lawrence to the Métis River, which it crosses about ten miles above its mouth, and is then clear of the highlands.

The distance from Halifax to Quebec, by the proposed line of Railway, will be about 635 miles.

Of these 124 miles are in the Province of Nova Scotia,
234 miles in New Brunswick, and
277 miles in Canada.

Commencing at Halifax, the comparative advantages of having the terminus in the city which is situated on the western shore of the harbour, or in the Village of Dartmouth, which is on the eastern side, and immediately opposite the city, becomes a matter of detail for future consideration.

From Dartmouth, the line passes through the broken chain of land which runs parallel with the south-east coasts of Nova Scotia, by the valley formed by the chain of lakes which extend from Dartmouth to the great Shubenacadie Lake, a distance of about twenty miles.

The highlands come in pretty close to the lakes on both sides, leaving here and there narrow flats along their borders. The rock is chiefly slate, and along the bottom of the valley are large quantities of loose fragments of rock from the adjacent hills, boulders, gravel, &c.

The gradients on this portion of the line, which has been calculated chiefly from the sections made for the Shubenacadie Canal, which was intended to follow this chain of lakes, will be favorable, though, from the rocky and broken character of the ground, it will be probably expensive.

For the first nine miles the line follows the western shores of the lakes. The hills are a short distance back, leaving a stripe of irregular, low ground, indented with bays, the water in which was shallow.

The summit level is at the south end of Lake Charles, from which the water flows into the Shubenacadie. The Dartmouth lakes, the first of the chain, empty themselves into Halifax Harbour, being sixty-five feet above high water, the rise from them to the summit level, Lake Charles, is only twenty-five feet, the distance being one mile.

After reaching the northern extremity of Lake William, nine miles from Dartmouth, the line crosses to the eastern shores of Lake Thomas, the next in the chain, and thence by the eastern shores of Lake Fletcher to the Grand Lake.

The western shores of these two lakes are bold and rocky, with deep water. The eastern are easy as respects curvatures, and the water is shallow, should it be necessary to build into them.

The railway will, however, probably interfere with the present line of road.

Should the terminus be in the City of Halifax, the line thence would join one coming from Dartmouth at the northern extremity of Fletcher's Lake, fifteen miles from Dartmouth, and nineteen from Halifax. The latter would be consequently the longest by four miles.

The summit level in the line from Halifax, between the waters flowing into Halifax Harbour and those falling into the Shubenacadie, is 232 feet above tide-water in the former. The gradients will be consequently more severe.

For the first seven miles after leaving Halifax, the line follows the shores of the Bedford Basin, a portion of Halifax Harbour, which are broken and rocky. To obtain curves of half a mile radius, heavy embankments will be necessary across the deep bays; for the remainder, the expense and difficulties will be about the same with a line following the lakes.

After leaving Bedford Basin, the line ascends the Valley of the Sackville River for about three miles. On the east side of this valley is the ridge of land separating the Halifax and Shubenacadie waters.

The most favorable point ascertained for crossing this is about 5¼ miles from the head of the Basin, and is 232 feet above its waters. The heaviest grade involved to reach this will be forty-three feet per mile for three miles. It will also involve a heavy embankment, about 700 feet long, between the summit level and the shores of the Long Lake, from which it will descend to the north end of Lake Fletcher, by the valley of the Rawdon River, where it joins the line from Dartmouth.

Between the north end of Fletcher's Lake and the point where the line will strike the Grand Shubenacadie Lake, are three ridges projecting into the lake, which will require to be cut through; the two next the Grand Lake being about thirty feet deep. Thence it follows the shore of the Grand Lake for about three-quarters of a mile. The high land comes out close on the lake, but the water is shallow.

Leaving the Lake shore at the 17¼ mile it crosses to the west shore of the Gasperean Lake. There is a low ridge between the two which will require cutting.

It will be necessary to carry the line along the shallow water on the west shore of the Gasperean Lake, leaving which it again strikes the shores of the Grand Lake at Sandy Cove, and follows it for half a mile to the outlet of the Shubenacadie River, which flows into the Bay of Fundy.

After leaving the Grand Lake, the line for nineteen miles follows the general course of the Valley of the Shubenacadie River, as far as the mouth of the Stewiacke River.

About two miles from the Grand Lake, it crosses the Shubenacadie River, and then follows the western side of the valley, which comes in with an easy slope to the river, and offers no obstruction. An embankment of some eight or ten feet high will be required across the Valley of the Nine Mile River, from which, to Barney's Brook, at the 27th mile, the valley is broad and open, and nearly flat, and thence for a mile it will be on the level margin of the river.

At this place, Black Rock Point, the land runs out high upon the river at both sides. A cutting will be necessary on the eastern side, about thirty feet deep, and a quarter of a mile long.

The rock being Plaster of Paris, with a covering of clay, it will be easily quarried. The line then crosses the river, the valley of which is crooked below this point, and passes through the high land on the western side by a grade of about thirty feet per mile, for less than a mile, and thence descends into a broad flat.

Between this and the mouth of the Stewiacke River, it crosses the Shubenacadie twice; the ground offers no obstructions, except an embankment which will be required at the 31st mile, about six feet high, for one mile, where the line crosses the broad marshes of the Shubenacadie, which are flooded by high freshets.

Between the crossing of the Stewiacke River, about 38 miles from Dartmouth, and the head of Truro mill-stream at the 50th mile, which is the water-shed of the Truro and Shubenacadie waters (145 feet above high water at Halifax), there will be several cuttings of from 15 to 20 feet deep, so that none of the gradients may exceed 40 feet in the mile, and these will be short.

From the 50th mile the line descends by the Valley of the Truro mill-stream, by an easy grade of about 17 feet per mile, to the Village of Truro, at the 55th mile, which it will pass a quarter of a mile to the westward, and cross the head of the Cobequid Bay by a bridge which will require to be about 500 feet long. From thence it commences the ascent of the range of hills known as the Cobequid Hills, which run north-east and south-west, nearly parallel with the bay, and directly across the line of the railway.

The rock formation, through which the first portion of the line passes, ceases at the Grand Lake: from thence to Truro the country, generally speaking, is of a fertile description, the hills being composed of a strong clay, with here and there limestone and gypsum rocks. The soil of the fertile valley in which Truro is situated, as well as the shores of the Cobequid Bay, is red sandstone.

After crossing the head of the Cobequid Bay, the line passes along the southern slope of the hills to the foot of the ascent of the 66th mile. In this distance it will have to cross the Chiganois and De Buit Rivers, and the swell of land lying between them, the highest elevation being between those rivers about 170 feet above high-water, but none of the gradients, it is calculated, will exceed 40 feet per mile.

The summit level which the line has to attain is by actual section determined to be 600 feet above high water, being at the lake from which the Folly River flows.

The section which has been accurately made, shows a gradient of one in 85 feet, or about 62 feet per mile, for 5¾ miles; but by keeping a higher level, the ascent to the lake may be overcome by a grade of 57 feet per mile for 6½ miles.

In this distance there are eight ravines to be crossed, four of which will require heavy bridges.

The Valley of the Pinebrook will require a heavy embankment, material for which will be supplied by a deep cutting necessary at the crossing of the road beyond.

The upper portion of the ascent, for four miles below the lake, is composed of hard igneous rocks, with a covering of earth in most places, but the rock will probably be met with if cuttings to any depth become necessary.

At about four miles on the south side of the lake, 71 miles from Dartmouth, there is a breadth of about half a mile of conglomerates, shale and sandstone, in which a

valuable deposit of speculative iron ore has been discovered: it is of very rich quality, and operations have been commenced by a company to work it.

The heavy grade ceases at the saw mill, half a mile below the lake, in which distance there are three small ridges to cut through, which will furnish material for crossing the shallow arm of the lake; thence the western shore is nearly straight, with shallow water, admitting of a level line, with easy curvatures, along its margin.

At the 75th mile a small ridge at the north end of the lake separates its waters from those of the Wallace River.

The descent from the lake is very rapid into the valley watered by that river. By actual measurement it has been ascertained that the ground falls 356 feet in the first three miles northwardly from the lake; thence the valley is broad and flat. The hills on the eastern side rise very abruptly, those on the western side having a gentler slope towards the valley, afford the most favorable ground for the location of the railway.

The actual section line, which has been run at a gradient of 70 feet per mile, may be improved upon by keeping a higher level, and the descent may be overcome by a gradient of about 66 feet per mile for 4¾ miles along the western side of the valley.

Here the hills turn abruptly to the westward, and on reaching the foot of this descent, at the 79th mile, some cutting will be necessary to carry the line with a radius of half a mile for one mile, round the shoulder of the hills.

A lesser range of hills lies north of the Cobequid range, which, at this point, is separated from them by the valley of one branch of the Wallace River which the line ascends for 2½ miles, at a grade of thirty-five feet per mile, and thence passes through this lesser range by the valley of the west branch of the Wallace River. Then crossing the valley of the Little Wallace River, it falls, at a grade of thirty-five feet per mile, to the valley watered by Tulloap's Creek, by which it descends at easy grades for about seven miles to the 95th mile, where it turns the shoulder of the ridge of land lying east of the River Philip by a curve of three quarters of a mile radius, involving some cutting, but to no great depth.

From thence it descends at a grade of twenty feet per mile for four miles along the fertile valley of the River Philip, which it will cross at a short distance below the confluence of the Black River, and ascend, for five miles, by the valley of the Little River, by a very easy grade.

From this to Bay Verte the country presents a very level appearance, and the line will probably deviate but little from a direct line.

The gradients will be most favorable, and none, it is expected, will exceed fifteen feet per mile.

At the 120th mile, the line crosses the Tidnish River, about a mile above its mouth, and thence follows the level shores of the Bay Verte, at the distance of from one to half a mile.

It leaves the Province of Nova Scotia 124 miles from Halifax Harbour.

The section of country traversed by the line, from the Cobequid Hills to Bay Verte, is, generally speaking, through light soil of good quality. There is little or no rock. Should any be met with, it will be sandstone, furnishing excellent building material.

Much of this portion of Nova Scotia is well cultivated and populous.

The line from Bay Verte enters the Province of New Brunswick, and as far as the crossing of the Miramichi River, at the 223rd mile, although running nearly at right angles to the course of the rivers flowing into the Gulf of St. Lawrence, will deviate but little from a general straight course and from the level nature of the country, although it will have to cross the swells of land lying between the different rivers, it may be expected confidently that the heaviest gradients will not exceed 40 feet per mile, the generality being very favorable.

As far as the Cocayne River the country traversed by the line is very level. The section line, which was run along the head waters of the rivers flowing into the Gulf of St. Lawrence, shows that the highest point is little more than 200 feet.

By following the general direction laid down on the plan, dependent, of course, upon the bridge sites which shall be selected on the different rivers, no difficulties of a serious nature will be encountered. Should any cuttings be necessary, they will not be expensive, as no rock is likely to be met with.

The section of country which will be opened up between Bay Verte and the Richibucto River, offers much excellent land for settlement. From thence towards the head waters of the Rouchibouguac are extensive flat barrens, and the country between that and Miramichi is very level.

The rivers are all small; and no heavy bridging will, it is expected, be required.

It is proposed to cross the south-west branch of the Miramichi River near the head of the tide, opposite the mouth of Indian Town Brook. It will require a bridge about 500 feet long and 30 feet high. There are heavy freshets in this river; but no damage need be apprehended to a well-constructed bridge, either from ice or freshets.

Between this and the north-west Miramichi River a detour will be necessary to the westward, to avoid the swell of land between these two rivers, and which runs to an elevation of about 300 feet. The line crossing the Miramichi, opposite to the mouth of the Indian Town Brook, will ascend by the valley to that brook, and then diverge to the westward, through a flat cedar country, to the north-west Miramichi River, which it crosses at the 234th mile, by a bridge which will require to be 2,000 feet long and 30 feet high, the river here being very wide and shallow. A sight requiring a bridge of less strength may probably be selected on further examination.

From the line follows the broad valley watered by the north-west Miramichi, as far as the 260th mile, at gradients varying but slightly from a level, excepting the first five miles, which will require gradients of about 25 feet per mile. The land between the north-west Miramichi waters and the Nipisiguit River traversed by the line is almost a dead level; and it descends to that river by a grade of 25 feet per mile for three miles.

It is proposed to cross the Nipisiguit River near the Pabineau Falls, and after following the valley of the Nipisiguit a short distance it continues as far as the 325th mile to follow the general direction of the shores of the Bay Chaleurs, passing within a short distance of the Town of Bathurst.

The precise direction of the line will of course depend upon the bridge sites selected on the several streams and rivers flowing into the Bay Chaleurs.

As far as the 305th mile, the land is very level, and the streams small. The Jaquet River lies in a large deep valley, but it is believed may be approached and crossed about four miles from its mouth without any great difficulty.

The gradients on this portion of the line will be found very favorable, and will not, it is calculated, exceed seventeen feet per mile, the greater portion being very much less.

The shores of the Bay Chaleurs are thickly populated. The inhabitants near Bathurst are chiefly Canadian French. Towards the Restigouche the inhabitants are principally Scotch, many of them having excellent farms.

After reaching the valley watered by the Eel River, the line may approach the Restigouche River, either by following the valley of the Eel River to its source, and thence by the valleys of several small streams, and reach that river either at the mouth of Christopher's Brook, seven miles above Campbellton, or at a point five miles above that.

The summit level at the head waters of the Eel River has been calculated at 368 feet, which will probably be found too high. This would involve a grade of about 18 feet per mile for 16 miles.

It will perhaps be better to avoid this gradient and the curves which will be necessary in descending the valleys of the small streams flowing into the Restigouche, to cross the Eel River and pass through the range of hills lying south of the River Restigouche, about five miles from the Town of Dalhousie. The hill which rises immediately in the rear of that town here falls away almost to the level of the country about Eel River, and from thence the line would follow the bank of the Restigouche, passing through the Village of Campbellton, and continuing between the present road and the shore as far as the mouth of Christopher's Brook. The gradients on this portion would be very slight.

Opposite to and above the mouth of Christopher's Brook, the Restigouche is full of islands; the mountains especially on the south shore, come down boldly to the river; and it is proposed to take advantage of these islands to cross the broad channel of the river to the more favorable ground on the north shore.

There is no accurate survey of these islands, but they are so numerous that the expense of bridging will not be greater than if the line were to cross above, when it would require a bridge at least 1,800 feet long and a heavy embankment on the north shore.

The danger from the rush of the ice freshets, which sometimes occur in the spring of the year in this river, will be less if the bridge be carried over among these islands.

After crossing the Restigouche River, the line will follow the north bank as far as the mouth of the Metapediac River, at the 350th mile.

The section of country lying between the Restigouche and St. Lawrence Rivers is a vast tract of high land, intersected in every direction by deep valleys and vast ravines, through which the rivers flowing to the St. Lawrence and Restigouche wind their course.

The height of land from which these rivers flow respectively north and south, is full of lakes, and along them the mountain ranges rise to a great elevation.

The average distance between these two rivers is about 100 miles.

The only available valley which my knowledge of the country, or the explorations we have carried on, enable me to report upon, by which a line of railway can be carried through this mass of highlands, is that of the Metapediac River.

This valley extends from the Restigouche to the Great Metapediac Lake, a distance of between 60 and 70 miles; and as the summit level to be attained in that distance is only 763 feet above tide-water, the gradients, generally speaking, are extremely favorable.

From the broken and rocky character of this section of country, some portions of this part of the line will be expensive, especially the first twenty miles of the ascent, in which the hills in many places come out boldly to the river, and will render it necessary to cross it in several places.

The rock formation is nearly all slate. There are settlements on the Metapediac River, as far as the Mill-stream.

Generally speaking, however, the greater portion of this section of country is unfit for cultivation, consisting of a gravelly rocky soil, covered with an endless forest of spruce, pine, birch, cedar, &c.

From the mouth of the river, as far as the 365th mile, the line continues upon the east bank. Above this, at the mouth of Clark's Brook, the rocky bank of the river is very unfavorable, and to obtain proper curves, it crosses to the point opposite, and then recrosses immediately above, to the more favorable ground on the east bank.

Between this and the mouth of the Ammetssquagau River, the line, to obtain good curves and avoid those places where the hills come out bold and rocky, crosses the river four times.

The position of the line for three miles above and below the Ammetssquagau River, where the hills are steep and rocky close on the river, will be the most expensive part of the line.

Above this the line follows the eastern bank to the 377th mile. The hills on either side are very high, but the eastern bank is pretty favorable. Between the 378th and 380th mile, the river turns twice almost at right angles, shut in on the south by a rocky precipice 150 feet high.

It will be necessary to cross the river three times here. The centre bridge will be a heavy one, but there is an island in the elbow, which will serve as a natural pier. Above this from the 380th mile to the forks (the mouth of the Casupscul River) at the 395th mile, the valley becomes more favorable. The hills on either side are not so lofty, and recede further from the river. The line crosses the river twice between the 385th and 390th mile, to avoid a rocky precipice on the left bank; and again about one mile below the Forks, making in the first 38 miles up the Valley of the Metapediac, twelve bridges in all. These bridges will average from 120 to 150 yards long.

From the 395th mile to the Metapediac Lake, the line continues on the eastern side of the valley; the ground is stony and uneven. The gradients will be very favorable, and, with exception of "The Grave," at the 405th mile, where there is a rocky spur running out on the river, there are no very serious difficulties.

The line again crosses the river at the 409th mile, and from thence follows the eastern side of the Metapediac Lake to the 420th mile.

The mountain ranges to the westward are very lofty. There are two spurs running out on the lake, at the southern end, which the line turns at easy curves close to the shore; beyond this it passes through a cedar swamp into more favorable ground at Brochers, clearing at the north end of the lake; from this it ascends to the summit level, 763 feet

above tide-water, at the 426th mile. This is the water-shed between the Restigouche and St. Lawrence waters.

Between this and the St. Lawrence the country is intersected and crossed by a constant succession of ridges, rising to a considerable elevation between the different small tributaries of the Tartigau and Métis Rivers. The line descends at easy grades by the valley of the former to the 432nd mile, where it turns to the westward, and ascends to the 435th mile, by the valley of one of its small tributaries. The water-shed here between the waters of the Métis and Tartigau is about 750 feet, and the descent from this to the Métis, by the Valley of Pachet's Brook, is rapid, and will involve a grade of fifty-five feet per mile, for eight miles, which will carry the line clear of the highlands.

Further explorations may probably suggest improvements upon this line through the highlands, which, however, as far as regards gradients and curves, is as favorable as can be expected.

A party was sent to explore for a line from the Metapediac River, westward, following the valley of one of its tributaries, and thence across to the Rimouski River, and, from the reports I received from them, it appears probable that a practicable line may be obtained following the Valley of Metallic's Brook, five miles below the forks of the Metapediac, and along a succession of lakes to the Rimouski, and thence by the Valley of the Torcadie River to the Abersquash, and by its valley to the point where the proposed line crosses it.

It would require a whole season to explore this section of country.

The proposed line, after descending the Valley of Pachet's Brook and the Valley of the River Métis, crosses the river at the 445th mile, about ten miles above its mouth, and ascends by the Valley of the River Haget, one of its tributaries, almost on a level to the water-shed at the 459th mile between the Métis and Rimouski waters, and descends to that river at the 469th mile, at a grade of 44 feet per mile, for five miles.

The Rimouski River lies in a deep valley, and the line descends to it at this grade by the valley of the "Ruisseau Bois Brûlé," to gain the opposite valley of the Rigamard stream, by which it is proposed to ascend to the table land lying between it and the Trois Pistoles River. A bridge, 500 feet long and 40 feet high, will be required across the Rimouski, as it is necessary to pass it opposite the mouth of the Rigamard. The hills on either side for the first two or three miles of this valley are steep; above that it widens, and the line reaches the table-land which extends to the Trois Pistoles River, at a grade which it is calculated will not be more than 20 feet per mile for six miles.

An improvement on this line may, perhaps, be made by descending the valley of the River Bois Brûlé, and ascending by the valley of the stream of the Little Rimouski.

The line proceeds at almost nominal grades to the Abersquash River, which it crosses at the 500th mile.

Four miles further the table-land is intersected by the deep ravine formed by the stream of the Trois Pistoles River.

This will require a heavy bridge. The width between the banks at top is 300 feet, the stream at the bottom is 100 feet wide; the ravine being 150 feet deep, it will be necessary to have the centre span as large as possible, to diminish the great height required for the piers.

The line from this continues at very favorable grades, crossing the Rivière du Loup at the 527th mile, about five miles above its mouth, and thence (either in the second or third concession) for 100 miles through a densely populated country, of the most favorable description, to the Boyer River at the 620th mile, from which it rises to Beaumont Church, 278 feet above tide water, and descends at a moderate grade for about nine miles, to Point Levi, opposite the City of Quebec.

(Signed,) G. W. W. HENDERSON,
*Captain, Royal Engineers.*

Major W. Robinson, R.E.,
&c., &c., &c.

TABLE of probable Gradients on proposed Halifax and Quebec Railway.

| Prevailing Gradients. | Canada. — Quebec to Restigouche River. | New Brunswick. — Restigouche River to Bay Verte. | Nova Scotia. — Bay Verte to Halifax Harbour. | Total. |
|---|---|---|---|---|
| | Miles. | Miles. | Miles. | Miles. |
| Level and under 20 feet per mile, | 222 | 151 | 66 | 439 |
| 20 to 40 feet " | 42 | 71 | 37 | 150 |
| 40 to 50 feet " | 5 | 8 | 10 | 23 |
| 50 to 60 feet " | 8 | 4* | 7 | 19 |
| 60 to 70 feet " | None. | None. | 4 | 4 |
| Total..... | 277 | 234 | 124 | 635 |

* This gradient will be avoided by following the Restigouche instead of the Eel River.

(Signed,) G. W. W. HENDERSON.
*Captain, Royal Engineers.*

## APPENDIX No. 2.

Plans referred to:—Nos. 17, 18, 19.

*Report on the Explorations from the Miramichi Lake, across the Valley of the Tobique, to the Restigouche River.*

The explorations carried on during the autumn of 1846, having shown that the chief difficulties to be encountered by any line of railway passing through the central portion of New Brunswick was the large valley watered by the river Tobique, which, running directly across the general direction of the line, must be crossed by it; and that the height of land on the southern side was of great elevation. The explorations were directed in the following year (1847) to ascertain the practicability of ascending to this height of land from the table land between the waters of the Miramichi and Naswaak Rivers to the westward of Boistown, and to which there is easy approach from the level country to the southward; and having gained that height of land south of the Tobique River, to ascertain the practicability of crossing its valley at the most favorable grades.

This valley is about 30 miles wide. The highlands bounding it on the south side are very lofty. The lowest point at which they can be passed, as ascertained by our explorations, being at a point about nineteen miles south of the River; 1,216 feet above the sea, or 874 above the river.

The height of land or water-shed on the north side of the valley is about twelve miles from the river, and 418 feet above it, 838 feet above the sea.

The exploration was commenced between the Napadogan Lake and the Miramichi Lake, about 20 miles north of the portage road from Boistown to Fredericton.

The line which has been reported upon as practicable involves, as will be seen, very heavy grades.

From the point of starting the line descends at a grade of about 54 feet per mile for two miles to the Miramichi Lake; thence it passes through a dry spruce country to the south-west of Miramichi River, which it reaches at the fifth mile; from this it follows the valley of that river for seven miles, at very easy grades, to the forks of the river, where it crosses the west branch and descends by the valley of the north branch, as shown by the

black line on the Plan to the point D, at the 21½ mile, at easy grades, shown by the red line on the Section; none exceeding 16 feet per mile.

Then it meets a ridge of land which will cause it to diverge to the eastward, and involve a grade of about 50 feet per mile for two miles; and thence follows the valley of the north branch of the Miramichi, at a gradient of 44 feet per mile. The valley here is very narrow and broken, the highlands coming in close on either side.

The line leaves the valley of the River Miramichi at the 26th mile, and follows the valley of one of its tributaries, called the Dead Water Brook, at the same grade of 44 feet per mile to the 28th mile, at the point F.

From this it continues along the same valley, but at an easier grade of 20 feet per mile, to the water-shed between the Tobique and the Miramichi Rivers, 1,205 feet above the sea, at the 30½ mile.

The Odell and Beaver Brooks take their rise on this height of land, being tributaries of the Tobique, and the line attains its summit level, 1,216 feet above the sea, at the small lake which is the source of the Odell, at the 31st mile.

A small ridge divides this lake from the waters of the Beaver Brook, which would have to be cut through.

From this point commences the descent into the Valley of the Tobique.

The direct descent by the Valley of the Odell, &c., had been found impracticable, the fall being far too rapid.

The most favorable gradient, which can be maintained, is one of 58 feet per mile, for nine miles, by keeping along the side of the hills as far as the River du Chute, crossing several streams, one of which, that of Beaver Brook, will require heavy bridging.

After crossing the River du Chute, which will also require a heavy bridge, the line descends, at a gradient of 15 feet per mile, for three miles.

Here it has to cross the Valley of the River Wapsky, about two miles wide, which will involve an ascending and descending grade of 66 feet per mile, each one mile, and a bridge of 40 feet high across the stream.

This point (C 2 on the plan) is the water-shed between the Wapsky and the Little Gulquac, and the line descends, at a gradient of 48 feet per mile, for 5½ miles, to the River Tobique, by the Valley of the Little Gulquac.

The Tobique, which the line crosses at the 50th mile, will require a heavy bridge, 50 or 60 feet high; the river is about 442 feet wide; on the south side the bank is bold and favorable for bridging, on the north is an interval flat, which will increase the length of the bridge to about —— feet.

After crossing the Tobique, the line, keeping to the westward of that actually explored, ascends, for the first five miles, at a gradient of about 20 feet to the mile, through a dry level tract of country.

From this the grade increases to about 44 feet per mile for three miles, to the point E, from which the line ascends by the valley of the west branch of the stream, called the Two Brooks, for four miles, at a grade of about 43 feet per mile.

It continues to ascend at this grade for four miles (to the point *a*), the water-shed between the Tobique and Salmon Rivers, being 12 miles south of the former and 418 feet above it.

Thence the line keeps westward of the exploratory line, avoiding the high ground crossed by it, following the valleys of the Salmon and Grand Rivers.

The first of these, it is calculated, will involve an ascending and descending grade of 20 feet per mile each four miles.

The line will ascend to the water-shed, between the Grand River and Beaver Brook, a tributary of the Restigouche River, about 920 feet above the sea, by an easy grade of about eight feet per mile.

From this point at the 78½ mile (*b* on plan) it descends to the Restigouche River, by the Valley of Beaver Brook.

It is calculated that the first 4½ miles will require a grade of 45 feet to the mile, and thence one of about 24 feet to the Restigouche River, about 11 miles. The whole distance being obout 94 miles from the Miramichi Lake.

Other valleys also exist by which it is believed the Restigouche may be reached, after leaving the Tobique Valley, and by about the same grades.

The Valley of Boston Brook would bring the line to the Restigouche more to the westward; that of Jardine's Brook would carry it more to the eastward and nearer to the valley of the Kedgwick River, which is the only tributary of the Restigouche, by which it is believed a practicable route can be obtained through the highlands between the Restigouche and St. Lawrence Rivers, on this general direction.

The tract of country which this line passes thorough, and would open up north of the River Tobique, is very excellent soil, and offers fine land for settlements.

(Signed,) G. W. W. HENDERSON,
*Captain, Royal Engineers.*

Major W. ROBINSON, R.E.,
&c., &c., &c.

## APPENDIX NO. 3.

Sketches attached.

*Report of Mr. Wilkinson.*

FREDERICTON, December 31, 1847.

SIR,—I have the honor to state to you the general results of the exploratory survey in which I have been engaged, under your direction, during the past summer and autumn, with the view to a discovery in part of a line favorable for a railway between Quebec and Halifax. In doing so, I will as much as possible observe the brevity which you desire me to regard as sufficient.

Passing by the subject of preliminary arrangements, and the circumstances which controlled the selection of the lines examined, it will be sufficient to say, that the general object was to discover a favorable route between the Valley of the Abawisquash, a branch of the Trois Pistoles, and a point on the Restigouche River, favorable for union with another division of the general line, in progress of exploration by Corporal Dumble, from the Valley of the Tobique River.

The line first examined I will describe as Route No. 1, so distinguished in the sketch hereto annexed.

Between the head of Lac des Iles, discharging itself into the Toledi, and the Abawisquash River, is a low depression in the summit level, or height of land, favorable, as I believe, for our object. From this point the ground appears generally practicable, following the margin of Lac des Iles, and thence the course of its discharge towards the outlet of Eagle Lake, a distance by estimation of about nine miles. From Eagle Lake, it is very probable that a communication with the Rimouski would be found by following the valley of the left hand branch of the Toledi to its source, and thence descending the Valley of the Touradi. But the more direct course, by Route No. 1, was experimentally continued. Between Eagle Lake and the Middle branch of the Toledi is a continuous ridge of 300 or 400 feet average elevation above the former. Like other ridges in the neighborhood, it consists of much good land for settlement, but apparently affords no pass suitable for our object, within an extent of six or seven miles. On exploring from the Middle branch westerly to the head of the lake, however, the descent appeared to exceed the ascent as much as 150 or 200 feet. A very direct communication would therefore be ineligible. The course to be recommended passes by an easy curve southward of the lake and the southern extremity of the ridge in the manner indicated in the sketch; thence, northeasterly by the Valley of the Middle branch. Where the line would enter this valley the general inclination is apparently about 25 or 30 feet per mile, until approaching within about three miles of the last of four successive rapids or falls. It is probable that the inclination here may be from 40 to 60 feet per mile, until we reach the dead or smooth

water. The banks of the Middle branch afford only a small extent of flat ground, say from one to three chains in width, on each side alternately, seldom on both sides at once; but the slope of the rising ground is commonly moderate, and without abrupt angles or turns, with the exception of the three miles just mentioned. Here some degree of difficulty might occur in determining the best site for the line. A small extent of rock cutting at one or two points, would probably be necessary. Time did not permit an instrumental examination of the ground, but nothing like impracticability is indicated.

Passing the Falls, the Valley of Middle branch south is level for a distance of about seven miles in a direct line south-westerly, including, in that distance, a lake of about two miles in extent. The bed of the valley consists of an alluvial deposit of great depth, through which the stream has a very tortuous channel, with a current scarcely perceptible, frequently very deep, and always remarkably clear. The next five miles of this valley ascend somewhat rapidly, say at the rate of 40 to 50 feet per mile.

From a distant but commanding point of view, I judged that the remaining rise might not be less favorable; but upon examination of the last four miles, the rate of ascent proved to be much more objectionable. The result, however, of a series of elevations and depressions, taken by your directions over this portion of the route, and which at leisure moments have been somewhat hurriedly computed, do not warrant me in saying that the rate of inclination of the four miles in question is more than objectionable. Its practicability is, I believe, proved by at least two examples of much steeper inclined planes daily ascended by locomotive power, with both passengers and freight. I refer to the Lickey Inclined Plane of one in thirty-seven on the Birmingham and Gloucester Railway, and another of one in thirty-four, which I understand to exist on the Hartlepool and Stockton. The sketch hereto annexed (No. 1) exhibits with regard to these the proportion of the more favorable acclivity, by which it appears practicable to escape from the valley of the branch of the Toledi under examination. No exploration has however been made in order to discover facilities, the existence of which I am not prepared to doubt, of improving or avoiding this aclivity. Much lateral exploration must at some points be expected. We could scarcely hope that we should succeed, at the first attempt, without map or guide, in passing through a wide extent of primeval and almost unknown forest, over a line in no respect objectionable.

Passing the summit level at the source of the Middle branch south, the route descends by the valley of the north-west branch of Green River. For the first five miles the rate of inclination is very moderate, deviating but little from a level; two lakes and much small water being included in that distance. From thence to the confluence of the east branch of Green River, a less regular and and often more rapid descent is indicated. In the judicious distribution of the irregularities over a continuous descent in actual construction however, I am not prepared to say, that an inclination exceeding 30 or 35 feet per mile would anywhere be necessary.

Descending the last nine miles of the north-west branch, the valley becomes more contracted, the flat margin generally narrower, the banks steeper and higher, and the turns more abrupt. But these characteristics do not become so remarkable as apparently to affect the practicability of this portion of the route, until we approach to within about three miles of the conflux of the two branches, or upper fork of the main Green River; nor do they continue of the same kind beyond about two miles along the eastern branch.

This part of the line having come under your personal observation in order to ascertain its practicability, by curves of admissible radius, a more particular survey of the apparent obstacles, and a rough plot of the same, were made for your satisfaction. For more ready illustration I avail myself of a trace from the original, No. 2, hereunto annexed, to which I beg leave to refer.

From A to I, being a distance of four miles and about 30 chains, are introduced six curves, of one mile radius each, arranged in a manner, the effect of which would be as follows:—From A to C the cutting would be insignificant; at B, about five or six chains in extent, partly of clay, slate may occur; at the point D, perhaps for an extent of ten chains in each direction, deep cutting may be necessary, but no sufficient examination has been made to determine this fact; or whether to some extent, a gap or depression may not exist, as at the point G. From E to I, the cutting would apparently be light, these points being nearly on the same common level with the intervening point G, or say thirty or

forty feet above the surface of the water at the confluence of the two branches. In order that in this part of the valley the roadway may be clear of water, snow, ice, and driftwood, at all times, perhaps a less elevation than about ten feet above the lowest level of the stream could not be recommended.

Assuming that the maximum depth of cutting to be admitted, should not exceed twenty-five feet, then the highest ground which could be intersected, would be thirty-five feet above the lowest level of the water. With the exception of the point D, the elevation of which is uncertain, it does not appear, from the facts ascertained, that the intersection of any point so high as thirty-five feet, would be necessary, in order to obtain curves of one mile radius; on that cutting approaching to twenty-five feet in depth, would occur to an aggregate extent exceeding fifty or sixty chains along the portion of the line shown on the sketch. Were it a desideratum to pass this, apparently the most confined and crooked portion of the route, without cutting, it would appear that curves of from twenty to eighty chains radius, would accomplish our object.

Pursuing the route along the east branch by an ascent apparently not exceeding thirty feet per mile, another branch occurs on the left, distinguished on the sketch as "Otter Branch." An opening here to the eastward was noted for further exploration. In the meantime, following the main stream about due south for three miles, another opening claims attention. It was at first deemed probable that this would lead to the source of the main Restigouche. It may indeed lead to a favorable communication with this stream. But it was subsequently discovered, as it will be again necessary to notice, that the opening in question was really at the head of the valley of a principal branch of Green River, distinguished on the sketch as Green River East. Resuming the exploration at the end of the southerly range just noticed, of the east branch, this stream again turns suddenly to the eastward, flowing somewhat tortuously through a narrow valley bounded by very high hills, and having a fall varying from sixty to ninety feet per mile. Having traced the stream to its source in a pass between high hills, and continuing an easterly course, we shortly meet with a spring, no doubt a tributary of the Restigouche, flowing south-easterly down a narrow and deep ravine. Crossing the head of this ravine, and passing over a high ridge, we descend suddenly 700 or 800 feet into the valley of the object of our search, the Gounamitz, a principal branch of the Restigouche. It was deemed probable that the source of the east branch of Green River, and that of the Gounamitz, might prove to be continuous and nearly on the same level. But it was now manifest, that the source of the former was in a high group of hills, bounding not the source, but the main Valley of the Gounamitz, where this stream is still comparatively large, say forty feet wide, with a brisk and copious current. Satisfied of the unfavorable prospect of a communication at this point, with Valley of the Restigouche, I returned to the opening by way of the Valley of the Otter Branch. Circumstances prevented my personal examination of the ground in this direction; but Mr. Ramsay, to whom I confided that service, reports that the source of the Otter Branch is surrounded by high ground without an opening; but that about two miles from the mouth of the stream, on its right or northern bank, is a low depression, affording a favorable communication with the valley of a stream flowing northwardly and eastwardly, and no doubt a tributary of the Restigouche. It is most probably the main branch of the south branch of the Quatawamkedgwick. He followed this newly discovered stream downwards, to where it receives a branch from the south, and then traced this branch upwards nearly to its source. By climbing he had a good view southerly beyond the source, and down the Valley of the Gounamitz, but was prevented, by unfavorable weather and other hindrances, from completing all I had directed him to perform. He does not doubt, however, the existence of a practicable communication between the east branch of Green River and the valley of the Gounamitz by the route he examined; but there will be about two to three miles of rough ground and steep banks. Whether these may occasion any real difficulty, an instrumental examination here, as well as at other points which have been noticed, will be necessary to determine. The general fact of practicability or otherwise, was, under the circumstances, all that we could hope to ascertain.

A route has now been traced from the Valley of the Abawisquash, to the Valley of the Gounamitz, which, with such corrections as might be expected would be necessary on a first examination, I believe to be practicable. I have also no reason to doubt, but many to induce me to confide in the practicability of the Valley of the Gounamitz down to the Res-

tigouche, with a general inclination, varying from 30 to 50 feet per mile. From its mouth is a favorable communication down the left bank of the Restigouche, to a point opposite the entrance of Beaver or Boston Brook, the termination of Corporal Dumble's route from the Tobique before mentioned. A bridge of 100 or 120 feet span at this part of the Restigouche would be necessary, and would probably be the only one of so large a span from hence to the St. Lawrence. In that distance numerous bridges will be required; but they will be generally small, and neither their number nor their several sites could be determined without an instrumental demarcation of the line.

In order to explain the further course of the exploration, it is necessary to say, that, after tracing the east branch of Green River to its source, and being yet uncertain of any favorable descent into the valley of the Restigouche, whilst that into the Valley of the Toledi also remains unimproved, it seemed probable that the abandonment of the Valley of Green River might eventually be necessary. The hope of avoiding this alternative seemed to rest upon the success of the three lateral explorations; the first, that by way of the Otter Branch, the success of which has already been mentioned; the second, that by way of the southerly opening, towards the supposed head of the Restigouche; the third, with a view to the discovery of a more favorable descent to the north-west branch of Green River, into one of the more northerly valleys of the Toledi, or, if necessary, into the Valley of the Rimouski.

Leaving Mr. Ramsay with directions to make these three explorations, as far as practicable, I proceeded to employ as much as might be available of the rapidly advancing season, in order to ascertain, by canoe, the character of such other routes as the country might afford from the Restigouche north-westwardly. The routes I had in view are distinguished on the sketch as No. 2 and No. 3.

Omitting the circumstancial matters of the exploration, I will commence my description at the Wagan Stream, the most southerly branch of the Restigouche. From hence, at an ascertained elevation of about 550 feet above the level of the sea, appears to be a favorable range of comparatively flat country, as observed from several commanding points of view, and as described by those who have passed over it towards the Sisson Branch, a favorable stream of moderate current, through a flat valley, and joining the main Tobique River, where the elevation has also been approximately ascertained at about 600 feet above the sea. The exploration of this extension of our route, continued by way of the right-hand branch of the Tobique towards Boistown, would probably have occupied the remaining portion of the season, had circumstances permitted me to leave the country behind me with satisfaction. This route, as marked by the dotted line in the sketch, is not much less favorable for communication with Route No. 1 than with No. 3; but natural obstacles would render it apparently more difficult for continuation north-westward by Route No. 2.

I may indeed here remark, that natural obstacles seem to magnify, both to the north and south of the Restigouche, as we advance eastward. Above the confluence of the Wagan, the banks of the Restigouche are comparatively favorable all the way up the stream as far as explored or observed. Descending the same stream below the Wagan, the banks become more abrupt and steep, but are neither so close or angular but that much cutting may be avoided by occasional bridging, and the inclination of the valley is very favorable.

The mean rate of descent from the Wagan to the sea cannot exceed seven feet per mile by the course of the river, but the much greater part of the aggregate descent must apparently occur above the Quatawamkedgwick, and cannot be estimated at a less mean rate than ten to fifteen feet per mile. But, diverging from the Valley of the Restigouche by Route No. 1, we find the banks of the Gounamitz higher and steeper than those of the head of the Restigouche, by Route No. 3, and again we find the banks of the Quatawamkedgwick, by Route No. 2, still higher and steeper than either, rising, in fact, 1,000 or 1,200 feet, very abruptly, above the bed of the river.

With regard to the last mentioned route, it was at first my design to explore the Quatawamkedgwick, by canoe, to its extreme northerly source, to have found the most favorable communication thence to the Valley of the Rimouski, and to have explored the latter as far as practicable. But insufficient opportunity of preparation, the advanced state of the season, and unforeseen causes of delay, obliged me to abandon the more difficult part of the undertaking, and I discontinued my ascent of the Quatawamkedgwick about a

mile up the north or main branch, returning thence and ascending by the south branch, less for the purpose of exploration than for a more direct return to the party I had left at Green River. As far as I am able to speak from personal observation of Route No. 2, the rate of inclination of the Valley of the Quatawamkedgwick is no doubt favorable, say not exceeding 15 to 30 feet per mile up to the south branch. Above this point, the inclination of both the north and south branches appears to be steeper, at least for some distance, say not less than 35 feet per mile; but I have reason to believe that towards the head of each of these branches, but especially the north branch, there is much flat ground. But to render these inclinations available, however, it is most probable that the amount of bridging and cutting would prove to be heavy, owing to the very limited portion of flat margin, and the abruptly steep, and generally rocky character of the banks. An exact survey might prove these obstacles to be more avoidable than they appear to be; but without such survey, no safe opinion could be formed.

These remarks will be understood to apply only to the main Quatawamkedgwick. The valley at the south branch is at several points wholly unfavorable for a railway, but it affords lateral openings which might be available.

Upon returning to Green River, by way of the portage from the south branch, I found that the party I left there, having explored the Otter Branch Route, and cut out and surveyed the portage, had proceeded on their way to explore from the north-western branch of Green River, with the view already explained; but having met you on the way, received your directions to return, and to explore more minutely the apparently objectionable part of the Valley of Green River, before described, and shown in Sketch No. 2, until I should rejoin them. This circumstance fortunately coincided with directions which in the meantime I had found it necessary to send them, to return and meet me at the portage; foreseeing, in consequence of unexpected casualties and delays that it would be impracticable to rejoin them either in the Valley of the Rimouski, or of the Toledi, as at first intended.

We had already been warned by snow and severe frost that only a small portion of the season remained. It appeared most desirable that this should be employed in tracing the supposed communication southerly from the east branch of Green River to the head of the Restigouche, and to join the survey to the end of my exploration by canoe, a little above the branch distinguished as "Return Branch" in the sketch, and also to examine, as far as possible, the features of Route No. 3, between the Valley of the Restigouche, and the Valley of the Squatuck, with the view to the connection of these by means of the lateral valleys of Green River

I therefore directed Mr. Ramsay to proceed by the east branch, and to survey by way of the southerly opening referred to, until he found the termination of my canoe exploration on the Restigouche, if it should prove that the opening led directly to the valley of this river. But as it was equally probable that he might find himself descending a branch of Green River, in order in this case to cut him off, my own undertaking was at the same time to survey from the main Green River eastwardly by its lateral valleys, towards the same point on the Restigouche. Mr. Ramsay's course proved to be down the branch of Green River distinguished in the sketch as Green River East, and he opportunely intersected my exploration a few hours after I had passed.

The connection with the Restigouche was shortly afterwards made, and the party returned with the view to explore north-westwardly for a favorable communication with the Squatuck. Some progress was made in the latter object, when another fall of snow and the increasing severity of the weather rendered it impossible further to prosecute the survey beyond the reach of our canoes, which were left at the main Green River, and on which we chiefly depended for our retreat.

It remains only to state the imperfect knowledge which an unfavorable opportunity enabled me to acquire of Route No. 3. I have already remarked that indications existed of a favorable communication between the head of the Restigouche and the east branch of Green River, if such an object were desirable, either as an improvement or variation of Route No. 1. I have also stated that Route No. 3 is favorable as far as it adheres, to the Valley of the Restigouche. From thence to the Valley of the Squatuck, are several lateral valleys and openings, which require more or less pains for due examination.

The only object which a cursory exploration could accomplish, was the discovery of

which of these valleys and openings might appear most entitled to a particular survey. I have reason to believe, that practicable lines, approximating to those indicated in the sketch, would be found. My opinion is, that the difficulties of this route are confined to an aggregate distance of perhaps five or six miles on each side of the Valley of Green River, and that they are not of great magnitude.

I have not personally examined, and have only partially seen, the Valley of the Squatuck, but it is generally better known than any part of the ground included in this survey, and is reported to be, as I believe it is generally, flat and favorable for a line of railway. From thence up the Valley of the left-hand branch of Toledi to the intersection of Route No. 1, the ground is flat with a very moderate ascent.

In the absence of barometers, by which to obtain an approximate section of the routes, as far as traced, the apparently difficult inclinations were occasionally tested by angles of elevation and depression; and from these, checked by the approximately known height of several points in the country examined, the assumed rates of inclination have been inferred. They would in most instances, I believe, prove to exceed what in actual construction would be necessary.

I may remark with regard to the habitable character of the routes, as far as examined, that No. 3 would be the most favorable for continuous settlement from the Valley of the Tobique to the Valley of the St. Lawrence.

Probably one-third, consisting of the more elevated parts of Route No. 1, would be unfavorable for settlement. Route No. 3, as far as examined, would not be suitable for cultivation immediately along the line, except at a few detached points, on account of the very broken and precipitous character of the banks of the Quatawamkedgwick.

I believe that each of the routes described, necessarily in very general terms, is practicable, as far as I have examined the same. Of the degree of practicability, or of the probable expense of construction, I conceive that no safe opinion could be formed without an approximate location. To discover what route or routes may be most eligible for preliminary survey, I deem to be the object of the exploration. A judgment upon this point with regard to any subdivision, must of course be materially governed by its relationship to the whole line. As far, therefore, as it may be either my duty or privilege, to offer an opinion, it is, upon its special merits, in favor of Route No. 3; and more generally because upon both national and colonial grounds, it appears most desirable to avoid any unnecessary deviation from the most direct line between the Bend of Petitcodiac and the River du Loup, which the natural facilities of the country will permit.

I have, &c.,

(Signed,) J. WILKINSON.

Major W. Robinson, R.E.,
Commissionor of Quebec and Halifax Railway
Exploratory Survey, &c., &c.

---

## APPENDIX NO. 4.

Plans Referred to:—Nos. 20, 21, 22, 23.

*Report on a Line of Railway from Whitehaven to Amherst.*

Halifax, March 14, 1848.

Sir,—Having been directed by you to explore and report upon the capability of the country for a line of railroad from Whitehaven to Amherst, we have attended to that duty, and beg leave to lay before you the following Report:—

The general formation of the country consists of long continuous ridges, with valleys between them, in an eastern and western direction. One of these ridges commences at

Cape Canso, passes Country Harbour, runs westerly on the south of the west branch of the St. Mary River, and continues onwards to the western parts of the Province. The crest of the ridge is near the northern side, whence it slopes gently to the sea-coast; the height is about 600 or 700 feet. It is cut through by the Valleys of Country Harbour River and of the St. Mary. There are several indentations across it between Country Harbour and Canso; viz., from New Harbour to Salmon River, about ten miles above its mouth; from Torbay, by Ingersol Betts Lake, to Salmon River, near its mouth; from Whitehaven to Crow Harbour; and from White Point to Fox Island.

Northwardly of this ridge there is another range of high lands, which, commencing at Cape Porcupine on the Gut of Canso, runs parallel to the former, and terminates in the highland southward and eastward of Truro. It is cut across by indentations from Country Harbour to Antigonish; from Glenelg to Antigonish, by College Lake; from Glenelg to Merigonish, by the east branch of the St. Mary and the French River, and by way of the East River to Pictou; also from Upper Stewiacke to Pictou, by the Middle River; besides several minor indentations. This ridge is of about the same general height as the former.

Between these ridges is a valley running from Chedabucto Bay, on the east, to the Basin of Mines, on the west. It is interrupted by some hills at the head of the Stewiacke, but it generally preserves the character of a continuous valley. The highest parts at the bottom of this valley, more immediately connected with the present survey, are between Guysborough and Country Harbour, about the head of Salmon River, and between Country Harbour and the St. Mary at Glenelg.

The latter of these is found, by barometrical measurement, at the place where we crossed with the line, to be 226 feet above the sea; the former appears to be about the same height.

The rock formation of the southern ridge is generally granite and various kinds of trap; that of the northern, coarse slates and shales, variously inclined to the horizon, but mostly vertical, with some patches of trap.

The valley is soft sandstone and slate in layers, horizontal, or but slightly inclined.

The coasts of the Atlantic and Chedabucto Bay are, so far as we could observe, composed of slate and shales of various kinds; the trap rocks, being confined to the high grounds. The general direction of the strata of these rocks is S. 60 E. by N. 60 W.

Our first care was to make enquiry of surveyors and others acquainted with the peninsula on which Whitehaven stands, as to its general features; and we were informed that the coast was rugged, but that in the interior there were extensive elevated flats, which, once gained, but little difficulty would be experienced in proceeding.

We accordingly adopted that course, and found a barren, rocky country, with elevated grounds, intersected with deep hollows, running across the course of the line. We pursued this line as far as Ingersol Betts Lake, and then abandoned it. It was now settled that we must either find a passage along the coast to Country Harbour, or get through to the northern side of the ridge, and follow the Valley of the Salmon River; but as this was known to be rough and difficult, and withal circuitous, we resolved to make the first trial upon the coast.

Commencing at Whitehaven, at A, near Haulover Cove, the line may be carried across a level neck of land to Molasses Harbour, and thence along the shore to that harbour to B, at its head. Thence about three-eighths of a mile up a pretty deep valley, brings us to the water-shed C, between Molasses Harbour and an extensive bay on a pretty large stream which flows into Cole Harbour at D. This water-shed is only about 20 feet above the high-tide mark, giving a passage as easy as can be desired.

The length of this section, A to D, is about eight miles.

From D to E, four miles, the line is along the shore, passing through low points of ground and shallow bays. On this section cuttings and embankments of about 20 feet at greatest will produce undulations within 40 feet to the mile.

From E to F, at the head of Torbay, six miles, there is a belt of flat ground between the high lands and the sea coast, upon which the road can be carried so level as to require no particular remark.

From F to G, across the peninsula, 3¼ miles. The highest part of this section is within 30 chains of F, and about 54 feet above the sea; thence it is nearly level to within

half a mile of the coast, where it is 50 feet in height; from which place it may descend, with a uniform grade of 40 feet to the mile, to G.

From G to the head of New Harbour at I, about two miles, there are several bluffs of slate rock, one of which will require a deep cut, or possibly a tunnel of about 300 yards in length.

Or, by passing over a ridge of about 100 feet in height at K, which may be done at grades of about 50 feet per mile, a mile and three-quarters would be saved in distance between Torbay and New Harbour; the expense not greater than by the shore. This will probably be found to be the most eligible route.

From New Harbour to L, Coddles Harbour, four miles; for the first two miles of this section, a track may be obtained quite smooth and level, on the remaining two miles there are a number of small slate ridges, about 30 or 40 feet high, with valleys but little above the sea level between them.

The direction of the strata is S. 60 E. by N. 60 W. They have not been examined, but it is probable that some of them will have to be cut through.

From Coddles Harbour at M, to the head of Isaac's Harbour, 8½ miles, there is but little difficulty in getting along the shore, except about a mile and a half at Coddles Harbour, where there is some broken ground that has not been particularly examined, but we do not apprehend much difficulty with that part. The remainder of the shore is sufficiently flat. It is supposed that a straight line can be found from L to M, but this has not been examined.

Between Isaac's Harbour and Country Harbour, three miles, is a ridge of 184 feet in height at N, which is its lowest part. On the eastern side of this ridge, from M to N, the rise is one in thirty-two; on the western side, from N to O, the descent may be brought to eighty feet to the mile.

It is possible that a better passage may be found about a mile to the northward; it has not been examined, but from the general formation of the country, there seems but little hopes of success.

It is probable that the only alternative in crossing this ridge, will be the employment of stationary power, or the tunneling of about a mile in length through whin-rock.

From O to P, about seven miles, there is between the hills which bound the valley and the water, a range of low ground with an irregular surface, upon which a line may be carried, so as to produce nearly a level by cuttings and embankings of twenty feet at the maximum.

Turning off at P, we proceed up the Valley of West Brook, a small stream which flows along the northern base of the southern ridge of hills formerly mentioned. Near the head of this stream at R, there is a water-shed, from which waters flow to the St. Mary by McKeen's Brook. The distance from the mouth of the West Brook to R, is four miles, and the height, by barometer, 226 feet; giving an ascent of 56 feet per mile. The cheapest route is along West Brook, the valley of which appears open and smooth; but if it be required to reduce the grade, the ascent may commence one or two miles further down Country Harbour River, keeping along the face of the highlands as shown by the line on the plan. The face of the highlands along the river is steep and broken, and would probably require a heavy expense, but along West Brook it appears pretty even.

By carrying the line to the river, one mile below the mouth of West Brook, the grade would be reduced to 45 feet per mile.

From R to S, two miles,—there are several small lakes with low ridges of ground between, which we did not particularly examine, but as seen from the road, we concluded it will be quite practicable to find a tolerably fair line between the lakes; the average descent will be about 15 feet per mile. Thence to T, at the St. Mary, 3½ miles, there is the Valley of McKeen's Brook, which, as appears, is smooth and open; the descent is about 40 feet per mile.

From T to Mr. Alexander Sutherland's, the highest settlement on the east branch of the St. Mary, 13 miles, the valley is, with few exceptions, pretty broad, with intervals along the river, and will present no obstacles except from freshets. We could not ascertain the depth of the freshets very correctly, but from information, and from ice-marks on trees, we conclude it would not exceed four feet.

The river may have to be crossed several times. The sectional area of water-way

required, will be from 300 to 500 square feet, according as the bridge may be higher or lower on the stream. The height of the river intervale at Sutherland's is, by a mean of five observations, 194 feet above the sea; and by a mean of two observations on different days, the height of T at McKeen's Brook is 54 feet, giving a rise of 140 feet in 13 miles,—about 11 feet per mile.

At about a mile above Mr. Sutherland's is the foot of the Falls, where the river descends in a rocky crooked channel, between cliffs of trap-rock, 90 feet in about a mile. This is a formidable obstacle; the river is too crooked to admit of a line in the chasm through which it flows, and the hills on the western side are high and steep; it will therefore be necessary to cut across the point on the eastern side. On this side we have, at the head of the Falls, a narrow ridge of trap-rock, of 60 feet in height, jutting upon the river from the eastward; and at the foot of the Falls, a deep valley, in which flows Campbell's Brook, coming in also from the east; both of which must be crossed. The valley will require a bridge or embankment of 500 feet in length and 30 or 40 feet in height, and the ridge, a tunnel of a quarter of a mile in length. By these means a grade of 60 feet to the mile may be obtained, as shown by the section.

Southwards of Campbell's Brook there does not appear to be any obstruction to a descending grade of 40 feet per mile, along the river hills down stream to the level of the river.

From the Falls to Lake Eden, about two miles, there are no difficulties: the banks in some places are near the river, and flat ground between them of moderate breadth; but there appears to be sufficient room for fair curvatures, though it may be necessary to cross the river two or three times. The rise in these two miles is about 15 feet.

From Lake Eden to Beaver Lake, about four miles, the line may pass close along the southern shore of Lake Eden, under a high range of hills, about a mile, to the entrance of a range of ponds and low ground two miles in length, leading westward to Beaver Lake—the head of the East River of Pictou. The height of Lake Eden above the level of high tide at Pictou is, by a mean of nine barometrical observations, taken on three successive days, 381 feet; Beaver Lake is, by a mean of five observations, taken on two different days, 398 feet above the same datum, and 17 feet above Lake Eden.

The water-shed between Lake Eden and Beaver Lake, at U, is within half a mile of the latter, about 40 feet above Lake Eden, and 23 feet above Beaver Lake.

There may be a uniform grade from Lake Eden to U, and from U, by the southern side of Beaver Lake, for about a mile and a half; giving for the former 30 feet and for the latter 16 feet to the mile.

From the foot of a range of flats connected with Beaver Lake, the East River of Pictou, which is here of a small size, begins to descend between high banks to the bridge on the St. Mary's Road, six miles. On this section the line must follow the river flats, which appear sufficiently wide to admit of fair curvatures, except a distance of about three-eighths of a mile above the bridge, when it will be necessary to run through a valley on the southern side, to avoid a narrow crooked channel through which the river flows between limestone rocks. On this section the river will have to be crossed several times. The section of water-way of the bridges may be from 100 square feet, near Beaver Lake, increasing as we descend to 300 feet. The flowage of the intervals does not exceed three feet.

The average descent will be, for the first three miles, about 15 feet, and for the remainder 33 feet per mile.

From the St. Mary's Road to Grant's Bridge, seven miles, the valley is broad and contains large intervals. The line, by cutting through some low upland points may be carried pretty straight. The average descent is about ten feet per mile.

From Grant's Bridge to the foot of the rapids, near three miles, the river is crooked and confined between highlands of stratified sandstone and limestone, several points of which would have to be cut through.

This will be an expensive section. There is one circumstance, however, that would tend virtually to reduce the expense; the stone, owing to its structure and dip, which is about 50 degrees with the horizon, will be easily quarried, and will come in for drains, ballast, &c., on the road, as cheap, probably, as materials would from any other source. It will also open some capital limestone quarries, and it is not improbable that building stone

would be met with, though we did not observe any seams of the sandstone sufficiently thick for that purpose. The average descent of this section is about 40 feet per mile.

From the foot of the Rapids to the Fish Pools, three miles, the line must keep along the river.

There will be little cutting through points, but it is likely there will be some bridging. The grade will be about 40 feet to the mile.

From Grant's Bridge, mentioned above, to the Fish Pools, there will be several bridges. It is impossible, by a mere passing glance at the river, to even guess very correctly at the number; but it is not likely that there will be less than five or six. The span may be about 60 feet, till we get below the west branch, when it may be enlarged to 80 feet. The bottom is of rock; and it is not unlikely that stone for the abutments will be found in the excavations for the road.

From the Fish Pools to the height of land between the Albion Mines and M'Culloch's Brook, at V, about three miles, there is a rise of about 133 feet. The ground will admit of a uniform grade, being about 44 feet per mile. At the Fish Pool it will be necessary to cross the river upon a bridge 30 feet in height, in order to get upon a ridge of tolerably level ground immediately above the steep banks of the river.

From V to Middle River at W, three miles, there is a dip of 40 feet into the Valley of M'Culloch's Brook, and then a swell of ground between this valley and Middle River. This swell may be crossed at grades of about 50 feet to the mile.

From W to H, two miles, the ground rises about 70 feet, being an average of 35 feet to the mile. It will be necessary to cross the Middle River, at the height of 40 or 50 feet, in order to get upon a flat table of ground on its western side.

From X to the West River at Y, four miles, there is a descent of 172 feet. The ground will admit of a nearly uniform grade, averaging about 43 feet per mile.

From Y to Z, 1½ mile, there is a rise of nearly 80 feet, giving an average of 53 feet per mile. The ground, though somewhat rough in some places, does not appear to contain any very formidable obstructions to a regular grade.

The point Z is on a flat table-land, from which the line runs off to the westward.

From Z to A', 2½ miles, the line passes over some undulations into the Valley of the Saw Mill Brook, thence up that stream in a broad valley, which, continuing westerly, becomes the bed of Black River, a branch of the River John.

The height of the water-shed between Saw Mill Brook and Black River at A', is 227 feet above tide-water, and the height at Z 96 feet above the same datum; the difference is 131 feet, and distance 2¼ miles, giving an average of 58 feet per mile.

It is likely that a uniform grade can only be obtained on this section by means of a good deal of earth-work. By embanking 16 feet at Y, and cutting 29 feet at A', the grade from Y to A, may be brought to 47 feet per mile; and from the peculiar form of the ground, it does not seem likely that there would be much additional expense.

From A' to the mouth of Black River, 8½ miles, the valley is nearly half a mile broad, the stream meandering through flat lands with a sluggish current, showing the fall to be very trifling.

The height at the mouth of Black River is not measured, but may be supposed about 100 feet, and the descent along the valley 14 feet per mile.

It will not be expedient to cross the River John below the mouth of Black River, because, though the general surface of the country is level, the river flows in a deep, narrow valley which would have to be crossed. Above this place the banks are low, and moreover advantage may be taken of the Valley of Nabiscump Brook, to obtain an easy rise to the table-land on the west of the river.

From the Forks of River John, mouth of Black River, we did not travel through the country, but ascertained it to be of the same character as the region along Black River,—a flat country, with sluggish streams flowing through it, and offering no material obstruction to the formation of a railroad.

From Waugh River, Tatamagouche, towards Amherst, we made no observations relative to this line, but the country is known to be so level that there would be little or no difficulty in getting a good railroad line across it.

With regard to curvatures, from our limited means of making up a judgment, we can say but little; but from the slight observations that we were enabled to make, we think there will be none of less radius than half a mile.

The distances are as follows:—

| | Miles. | |
|---|---|---|
| From Whitehaven to Cole Harbour | 8 | |
| Cole Harbour to Torbay | 8 | |
| Torbay to New Harbour | 5½ | |
| New Harbour to Isaac's Harbour | 12½ | |
| Isaac's Harbour to Country, Mr. Archibald's | 6 | |
| | | — 40 |
| Country Harbour to Glenelg | 13½ | |
| Glenelg to the summit of the highlands two miles west of Lake Eden. | 20 | |
| Summit of highlands to Albion Mines | 21 | |
| | | — 54½ |
| Albion Mines to West River | 10 | |
| West River to River John | 12½ | |
| | | — 22½ |
| River John to Tatamagouche | 14 | |
| Tatamagouche to Wallace | 12 | |
| Wallace to the Province Line at Otter Creek | 38 | |
| | | — 64 |
| Total from Whitehaven to the Western Boundary of the Province. | 181 | |

Respecting the ice at Whitehaven, the result of a good deal of enquiry amongst the inhabitants, and of shipmasters accustomed to the navigation of the coast, is as follows:—That the harbour is frozen regularly in winter as far down as Fisherman's Island. Haulover Cove is also regularly frozen. Beyond these limits, though it is sometimes frozen, the liability does not seem to be greater than in Halifax Harbour. It was in consequence of this information that we fixed upon the point A for the terminus of the line. The ground will admit of a branch to the upper part of the harbour, which we have shown upon the plan.

The sea ice breaks up in March, and floats to the southward; that which passes through the Gut of Canso is in no great quantity, and in ordinary weather is set off by the current of Chedabucto Bay towards Sable Island. The main body of ice met with in that sea, passes eastwardly of Cape Breton, and with northerly and westerly winds is carried out to sea; but easterly weather brings it on to the coast of Nova Scotia. We could not learn that Whitehaven had ever been completely closed with this ice, but it has often been in such quantity as to make navigation in the night dangerous, and sometimes, at distant intervals of time, it has been in such quantity as to make the approach in daylight very difficult. On the whole it would appear that between the last of February and last of April, it may be accounted dangerous for a steamer to run in the night near Cape Breton, and direct from thence to Whitehaven; as there would be almost a certainty of having to cross a stream of floating ice in some part of this sea, though it but seldom happens that it approaches Whitehaven.

All which is respectfully submitted by,

Yours, &c.,

(Signed,) GEORGE WIGHTMAN.

A. CALDER,

*Sergeant, Royal Sappers and Miners.*

Major W. Robinson, R.E.,
&c., &c., &c.

## APPENDIX NO. 5.

*Remarks on the inner part of the Entrance of Whitehaven.*

Columbia, Halifax, N. S.,
August 27, 1846.

Sir,—In pursuance of your orders, I have made a rough sketch of the inner part of

the Entrance of Whitehaven, which, with the accompanying remarks, I beg to submit for your consideration:—

In fine clear weather, and by day-light, the approach to Whitehaven is easy, the shores being bold, and no out-lying dangers, if we except two rocks nearly a mile distant from the shores of White Island, one to the south-west and the other to the south-east. These generally break and so show themselves.

White Island forms the turning point of the shore of Nova Scotia, as it deflects toward the northward to Canseau. The white rocks, and its elevation of 140 feet, make it stand out prominently, and easily distinguish it.

There are several channels in Whitehaven. Three can be used by steamers of any size. The middle, which is between White Island and the ledges to its westward, appears to be best, is about 250 fathoms broad in its narrowest part, and carries bold water on both sides, and is besides the shortest and most direct, not exceeding half a mile in length. However, as the directions of the channels differ, and all radiate nearly from the same point, a sailing vessel can use the most favorable with respect to the winds. The western is also a very good channel, and is preferable for vessels going or coming from that direction. The soundings without this harbour are (near the shore) very irregular, especially in the approach to the eastern channel, which is also injured for vessels of large draught of water, by a rocky patch of thirteen or fourteen feet water. It is situated near the entrance, and rather more than one-third across channel, from the small island (Grassy Patch) off White Island.

When inside the harbour, care must be taken, as there are several shoal rocky patches (see Plan), which render the navigation difficult to strangers, and require to be well determined and buoyed, should the harbour be used for commercial purposes. There is an abundance of safe anchorage, with good holding ground, black muddy bottom, land-locked, and perfectly smooth.

In foggy weather this harbour is difficult of approach, especially to a stranger, as the soundings inshore are very irregular; and I have not been able to learn any good indications of its vicinity to be gathered from the lead, so as to render its approach by that means certain; and Torbay, its immediate neighbour to the westward, is a dangerous place to get into.

From the fishermen and small coasters I understand the currents round the point are uncertain, and generally depend on the wind, though the prevailing current is to westward.

I experienced the current in a boat when I visited the outer break; it was then setting to the westward at the rate of one mile and a half per hour at least. I also perceived vessels in the offing setting rapidly in the same direction; the breeze was from the eastward and light, though it had previously blown hard from the same point. We also, in our passage from Halifax to Canseau, during a fog, with the wind from the south-west, experienced an easterly current; but the land once made, the harbour is easily attained, especially by a steamer.

A judicious arrangement of fog-signals and light-houses, with buoys on the principal dangers, and a good survey, with the sea-soundings well laid down, would make the approach in the night or during fogs attended with small danger to a careful seaman.

Latitude of observation, Rock Whitehaven, 45° 14′ 0″ N. Longitude of observation, Rock Whitehaven, 61° 11′ 4″ W. Variation, 21° 42′ 20″ W. Rise of tide from three to six feet. High water at the change of the moon, 7h. 40m.

In the Admiralty Plan of this place, the general features and soundings appear correct, if we accept some of the inner dangers, which are not noticed; but the scale is discrepant.

I have, &c.,

(Signed,) P. FRED. SHORTLAND,
*Lieutenant and Commander.*

The Hon. W. F. Owen, Captain, R.N.,
&c., &c., &c.

*(Received from Mr. Des Barres, Solicitor General, May 2, 1848.)*

To the Board of Directors of the Projected Railroad from Nova Scotia to Quebec:

GENTLEMEN,—We, the undersigned, Magistrates of the County of Guysborough in the Province of Nova Scotia, hereby beg to state, that believing a Report to have been made to the surveying party engaged in the survey of the contemplated railroad from this Province to Quebec, and that such Report has been made by certain inhabitants in the Settlement of Torbay, near Whitehead, who supposed (in ignorance of the nature of such lines of communication) that the present facilities of intercourse with the interior of the country for purposes of procuring fuel from the woodlands, &c., would be entirely broken up in the event of the railroad terminus being at Whitehaven, and therefore have stated to the surveying party on the Whitehead Route, that the "winter navigation to the spacious harbour of Whitehead is quite impracticable from ice."

We therefore, in view of the injurious tendency that such false information is calculated to produce on the minds of those unacquainted with the locality referred to, have obtained the accompanying affidavits of persons residing at Whitehead, and likewise of captains of coasting vessels residing in other places in this Province, and of long experience in the winter navigation on the coast of said Province, testifying to the capabilities of Whitehead Harbour at all seasons of the year.

To all of which we, as the residing Magistrates of the County of Guysborough, wherein Whitehead is situated, beg hereby to record our certificate of their correctness.

Dated at Canso, Nova Scotia, January, 1848.

(Signed,) ROBERT HARTSHORN, J.P.,
R. M. CUTLER, J.P.,
WENTWORTH TAYLOR, J.P.,
E. H. WAUCHEVILLE, J.P.,
ABR. N. WHITEMAN, J.P.,*
W. J. BEYLOU, J.P.,
DAVID DOBSON, J.P.,†
E. J. CUNNINGHAM, J.P.,
WILLIAM HART, J.P.,
FRANCIS COOK, J.P.,
R. V. REEFEMAN, J.P.

---

*Copies of affidavits referred to in the above communication.*

(1.)

*William Spears*, of Whitehaven, in the County of Guysborough, fisherman, maketh oath and saith,—That he hath resided at Whitehead aforesaid for twenty-eight years, and is well acquainted with the Harbour of Whitehead aforesaid, and also with the drift ice which passes from the eastward, also from the Gut of Canso to the westward, in the spring of the year; that the ice seldom comes into the said harbour in large bodies, and very seldom remains there long enough to prevent vessels entering the said harbour at any time of the year, it being carried away by the winds and currents, and dispersed over the ocean, generally in a south-westerly direction; that during deponent's residence at the said harbour he has not known a day on which vessels of the largest class would be prevented entering therein by ice, the said harbour being perfectly accessible at all seasons of the year.

Sworn before me, at Whitehead, this 25th day of December, A.D., 1847.

(Signed,) DAVID DOBSON, J.P.

---

* One affidavit sworn before him, January 14, 1848.

† Four affidavits, December 25; One affidavit, January 12.

(2.)

*Robert Spears*, of Whitehead, in the County of Guysborough, fisherman, maketh oath and saith,—That he hath resided at Whitehead aforesaid for twenty-eight years; that he is well acquainted with the Harbour of Whitehead, and also with the action of the ice which occasionally comes through the Gut of Canso, and also round the Island of Cape Breton, passing on to the westward, in the spring of the year; that the ice very seldom comes into the said harbour in large bodies, and very seldom remains therein long enough to prevent vessels entering the said harbour at any time of the year, it being carried away by the winds and currents, and dispersed over the ocean, generally in a south-westerly direction; that during this deponent's residence at the said harbour, he never knew the ice to come into the said harbour in a large quantity but once, and that was in the year 1828, and then not to prevent vessels to enter said harbour, the harbour being perfectly safe and accessible at all seasons of the year.

(Signed,) ROBERT SPEARS.

Sworn before me, at Whitehead, this 25th day of December, 1847.

(Signed,) DAVID DOBSON, J.P.

---

(3.)

*John Munrow*, of Whitehead, in the County of Guysborough, fisherman, maketh oath and saith,—That he hath resided at Whitehead thirty years; that he is well acquainted with the Harbour of Whitehead, and also with the navigation of the said harbour, from the entrance to the extremity; that he is acquainted with the action of the ice, which occasionally makes its appearance off the said harbour, passing on in a south-westerly direction; that it seldom comes in in large bodies, and very rarely remains therein long enough to prevent vessels conveniently entering the said harbour at any time of the year, it being generally carried away by the winds and currents, and dispersed over the ocean in a south-westerly direction; that during this deponent's residence at the said harbour, he has never known a day on which vessels of the largest class would be prevented entering therein by ice, the said harbour being perfectly safe and accessible at all seasons of the year.

(Signed,) JOHN his × mark. MUNROW.

Sworn before me, at Whitehead, this 25th day of December, 1847.

(Signed,) DAVID DOBSON, J.P.

---

(4.)

*John Feltmate*, of Whitehead, in the County of Guysborough, fisherman, maketh oath and saith,—That he hath resided at Whitehead aforesaid for twelve years; that he is acquainted with the action of the ice, which occasionally comes through the Gut of Canso and around the Island of Cape Breton, and which passes Cape Canso to the westward in the spring of the year; that the ice very seldom comes into the Harbour of Whitehead aforesaid in large bodies, and never remains there long enough to prevent vessels entering the said harbour at any time of the year, it being carried away by the winds and currents, and dispersed over the ocean, generally in a south-westerly direction; that during this deponent's residence at the said harbour, he has but once only known a few clumpits of ice to come into the said harbour, which went out the next day; and has not known a day during the above period on which vessels of the largest size would be prevented entering therein by the ice, the said harbour being perfectly free and accessible at all seasons of the year.

(Signed,) JOHN FELTMATE.

Sworn before me, at Half Island Cove, in the said County, this 25th day of December, 1847.

(Signed,) DAVID DOBSON, J.P.

(5.)

*Thomas Monro*, of Whitehead, in the County of Guysborough, mariner, maketh oath and saith,—That he hath resided at Whitehead aforesaid about twenty-eight years, and during the greater part of the years aforesaid owned a vessel and sailed her as master; that he is well acquainted with the action of the ice which occasionally appears off Whitehead, passing on in an oblique direction from the shore to the south-west; that the ice never during his residence at said harbour came in in large bodies but once, and remained but a short time; with this one exception, deponent does not remember one day that vessels of the largest class would be prevented entering said harbour, it being perfectly safe and accessible at all seasons of the year; deponent further saith, that he hath been coasting to Halifax, and all along the shores of Nova Scotia, at all seasons of the year, and has never, on his return or outset, been prevented going or entering the aforesaid harbour during the time of his residing as aforesaid.

(Signed,) THOMAS MONRO.

Sworn before me, at Whitehead, this 12th day of January, A.D. 1848.

(Signed,) DAVID DOBSON, J.P.

---

(6.)

*Abraham Whiteman*, of Canso, in the County of Guysborough, maketh oath and saith,—That he is now in the eighty-seventh year of his age, and that he was a coasting trader on the coast of Nova Scotia for more than half a century and was in and about Whitehead, on the coast of said Province, at all times of the year, and always found the harbour there accessible and perfectly safe at all times.

(Signed,) ABRAHAM WHITEMAN.

Sworn before me, at Canso, January 14, 1848.

(Signed,) ABRAHAM N. WHITEMAN.

---

*Heads of information obtained by Captain Henderson, Royal Engineers, at Whitehaven, in October*, 1847.

The ice from the Gulf of St. Lawrence, &c., comes round Cape Breton and through the Gut of Canso, in the spring of the year, and is brought by the easterly wind off the N. E. coast of Nova Scotia, and if the wind chops round to the southward, it drives this ice into Whitehaven, Torbay, &c.

The harbour had been blockaded nine or ten times in the recollection of my informant, who had lived on that coast for nearly forty years.

Four years ago the Harbour of Whitehaven was blocked up with drift ice for about ten days.

Generally speaking, it is more or less incommoded by drift ice, every two or three years.

It was frozen over in the winter of 1846–47, five or six inches thick all the way down to Big Island, at the mouth of the harbour.

This was considered unusual, as it requires the weather to be cold and very calm to freeze so much of the harbour. It freezes, however, every winter as far down as the long point opposite Fisherman's Island.

(Signed,) E. W. HENDERSON.
*Captain, Royal Engineers.*

---

## APPENDIX No. 6.

*Report of the Sub-Committee, to whom was referred the communication from Lieutenant E. Walcott Henderson, Royal Engineers.*

COUNCIL ROOM OF THE QUEBEC BOARD OF TRADE,
Quebec, May 12, 1847.

The Sub-Committee, to whom was referred the coummunication from Lieutenant E. Walcott Henderson, Royal Engineers, have to Report that, owing to the manner the accounts are kept at the custom-house, and the nature of the trade with the Lower Ports, the value of the imports and exports cannot with any degree of accuracy be ascertained, and more especially to that portion of our trade with Gaspé, as, being in the Province, a mere matter of form of clearance and entry inwards is observed.

Your Committee beg to hand at foot a statement of the number of clearances and arrivals to and from the various ports named in Lieutenant E. Walcott Henderson's letter, for which they are indebted to the Collector of the Customs, and although they abstain from giving the nature of the cargoes, owing to the causes above stated, they would remark, that, with the exception of but one vessel which cleared in ballast, the remainder had cargoes; those from Halifax in general with valuable cargoes of West India Produce, and from the other ports, fish and oils. The outward cargoes consisted almost exclusively of flour, provisions, &c.

With respect to the eastern ports of new Brunswick, your Committee are not of opinion that the trade between that portion of the above Province and Canada has materially increased within the last few years; and with respect to the trade with ports in the Bay of Fundy, regret to say that it has all but ceased, which your Committee attribute to the changes in the Imperial laws, more especially the Act passed in 1842, generally called Gladstone's Act; before the passing of which all American provisions, by passing through the Canadas, were allowed to take the privileges and character of Canada produce and imported into our sister colonies as such, but with that change all inducements to receive their supplies from this ceased, as the proximity of those ports to Boston and New York, and the cheapness of breadstuffs and provisions in those markets, offered superior advantages, and the result has been as stated; the same remarks apply, to some extent, to Halifax, and other ports in Nova Scotia, where merchants, from their large increasing trade with Boston, by shipments of coals, plaster, &c., are enabled to take advantage by the return vessels of very moderate rates of freights, and a selection from a comparative cheap market.

With Gaspé the trade has been gradually increasing, and your Committee confidently look forward to be able to report the same with respect to our sister colonies, as our unrivalled canals are now being brought to a completion, and the spring of 1848 will see a fresh trade with the west brought into existence, and craft containing three to five thousand barrels of flour loading in Lakes Erie, Michigan, and Ontario, brought to our doors. With this a reduction in freights must follow; and your Committee do not see why a barrel of flour or pork cannot be sold as cheap in Quebec and Montreal as it can in New York or Boston; and if one of the inducements to purchase in the American markets is removed, the other, viz., the proximity, will vanish with a railroad communication with Halifax, for we do not entertain any doubt but that St. Johns will connect herself with the Trunk Line by a branch.

Among the almost numberless advantages that would follow the building of a railroad, both politically and commercially, your Committee would point out the certainty of a transportation to a sea-port in either New Brunswick or Nova Scotia, during the period our navigation is impeded with ice, of a large portion of breadstuffs which every winter is locked up in Quebec and Montreal, to the great injury of the Province at large, to which may be added the advantage that would follow by the transmission of the mails by the road, for which the Government now pay so large a sum for the transmission through the United States, which, for many weighty reasons, is objectionable, and, we may add, offensive to the feelings of a large portion of the inhabitants of both Canada East and Canada West.

The Committee do not conceive they are called on to go into any length on the vast benefits that might follow by the line of railroad that is now engaging the attention of Government, to which the attention of this Province as well as that of New Brunswick and Nova Scotia is so earnestly drawn, and in closing this Report, the Committee would in the most urgent manner bring the attention of the Imperial Government, through the present channel of communication, to the absolute necessity of freeing the inland navigation of the St. Lawrence from all obstructions that now exist, and which prevent American vessels from bringing their produce (for your Committee would not recommend their being allowed to carry any other than their own) direct to Quebec, or should they wish it, to use our canals to take their produce to any market they think proper, without breaking bulk; this course we think highly desirable, as well as the equally desirableness of all our tolls being reduced to the lowest practicable scale, which, if followed up, must draw the vast produce of the West down our noble river, and for which trade there are now so many rivals in the field.

ARRIVALS FROM—

| | Vessels. | Tons. | Men. |
|---|---|---|---|
| Gaspé | 59 | 2,545 | 222 |
| New Carlisle | 20 | 796 | 71 |
| Antigonish | 16 | 972 | 59 |
| Aichat | 14 | 792 | 55 |
| Bathurst | 1 | 44 | 3 |
| Caraquette | 7 | 245 | 20 |
| Dalhousie | 1 | 37 | 3 |
| Guysborough | 4 | 205 | 15 |
| Halifax | 17 | 1,257 | 71 |
| Miramichi | 3 | 400 | 30 |
| Pictou | 2 | 79 | 6 |
| Richibucto | 7 | 250 | 23 |
| Sydney | 3 | 563 | 27 |

CLEARANCES FOR—

| | Vessels. | Tons. | Men. |
|---|---|---|---|
| Aichat | 12 | 749 | 42 |
| Bathurst | 7 | 320 | 25 |
| Canso | 1 | 68 | 4 |
| Caraquette | 3 | 103 | 10 |
| Cocayne | 1 | 38 | 3 |
| Dalhousie | 9 | 349 | 30 |
| Guysborough | 2 | 95 | 8 |
| Halifax | 18 | 1,386 | 74 |
| Miramichi | 27 | 1,376 | 96 |
| Pictou | 3 | 184 | 11 |
| Richibucto | 9 | 418 | 28 |
| Restigouche | 8 | 315 | 23 |
| Shippigan | 1 | 47 | 3 |
| Sydney | 2 | 215 | 10 |
| Shelbourne | 1 | 30 | 3 |
| Gaspé | 84 | 3,334 | 249 |
| Carleton | 3 | 107 | 10 |
| New Carlisle | 10 | 489 | 32 |

## APPENDIX NO. 7.

*Extract from the Report of the Commissioners appointed by the Legislature of the State of New York—by the Act of May* 11, 1846—*to locate certain Portions of the New York and Erie Railroad—made to the Legislature, January* 18, 1847.

COST OF MOTIVE POWER ON RAILROADS, PER TRAIN, PER MILE.

1st. Engine-men, Fire-men, and Station-men :—

| | Cents. | |
|---|---|---|
| Baltimore and Ohio Railroad | 5 | |
| Utica and Schenectady " | 8 | |
| Reading " | 4.55 | |
| Boston and Worcester " | 5.50 | |
| Fitchburgh " | 7.00 | |
| | 30.05 ÷ 5 = | 6.01 |
| New York and Erie " | 7.485 | |

2nd. Fuel :—

| | | | | |
|---|---|---|---|---|
| Reading | Railroad, Wood | $3.50 | 23.70 | |
| Boston and Worcester | " " | 4.90 | 22.20 | |
| Fitchburgh | " " | 4.25 | 14.17 | |
| Baltimore and Ohio | " Coal | 2.00 | 8.00 | |
| | | | 68.07 ÷ 4 = | 17.02 |
| New York and Erie | " | | 18.09 | |

3rd. Repairs of Engines and Tenders :—

| | | | |
|---|---|---|---|
| Reading | Railroad | 4.90 | |
| Boston and Worcester | " | 9.05 | |
| Utica and Schenectady | " | 7.93 | |
| Fitchburgh | " | 5.20 | |
| Western (Mass.) | " | 6.50 | |
| Baltimore and Ohio | " | 9.00 | |
| | | 42.58 ÷ 6 = | 7.09 |
| New York and Erie | " | 8.75 | |

4th. Oil and Cotton Waste :—

| | | | |
|---|---|---|---|
| Reading | Railroad | 1.74 | |
| Boston and Worcester | " | 1.24 | |
| Fitchburgh | " | 1.30 | |
| Baltimore and Ohio | " | 1.46 | |
| | | 5.74 ÷ 4 = | 1.43 |
| New York and Erie | " | 2.94 | |

5th. Interest on cost of Engines :—

| | | |
|---|---|---|
| Baltimore and Ohio Railroad | 3.01 | |
| | ..... = | 3.01 |

6th Conductors and Brakemen :—

| | | |
|---|---|---|
| Reading Railroad | 4.11 | |
| Fitchburgh " | 6.20 | |
| | 10.31 ÷ 2 = | 5.15 |
| Take 63 per cent. for brakemen (which is the ratio on Reading Road), as conductors should not be included, and the expense for brakemen is | 5.15 × .63 = | 3.14 |
| Do Baltimore and Ohio Railroad, as per estimate for coal trade | = | 2.40 |
| | 5.54 ÷ 2 = | 2.77 |
| New York and Erie Railroad | = | 6.52 |

7th. Repairs of Railroad, chargeable to Locomotive and Tender:—

1st. Ordinary repairs; of these one-fifth is regarded as chargeable to motive power:—

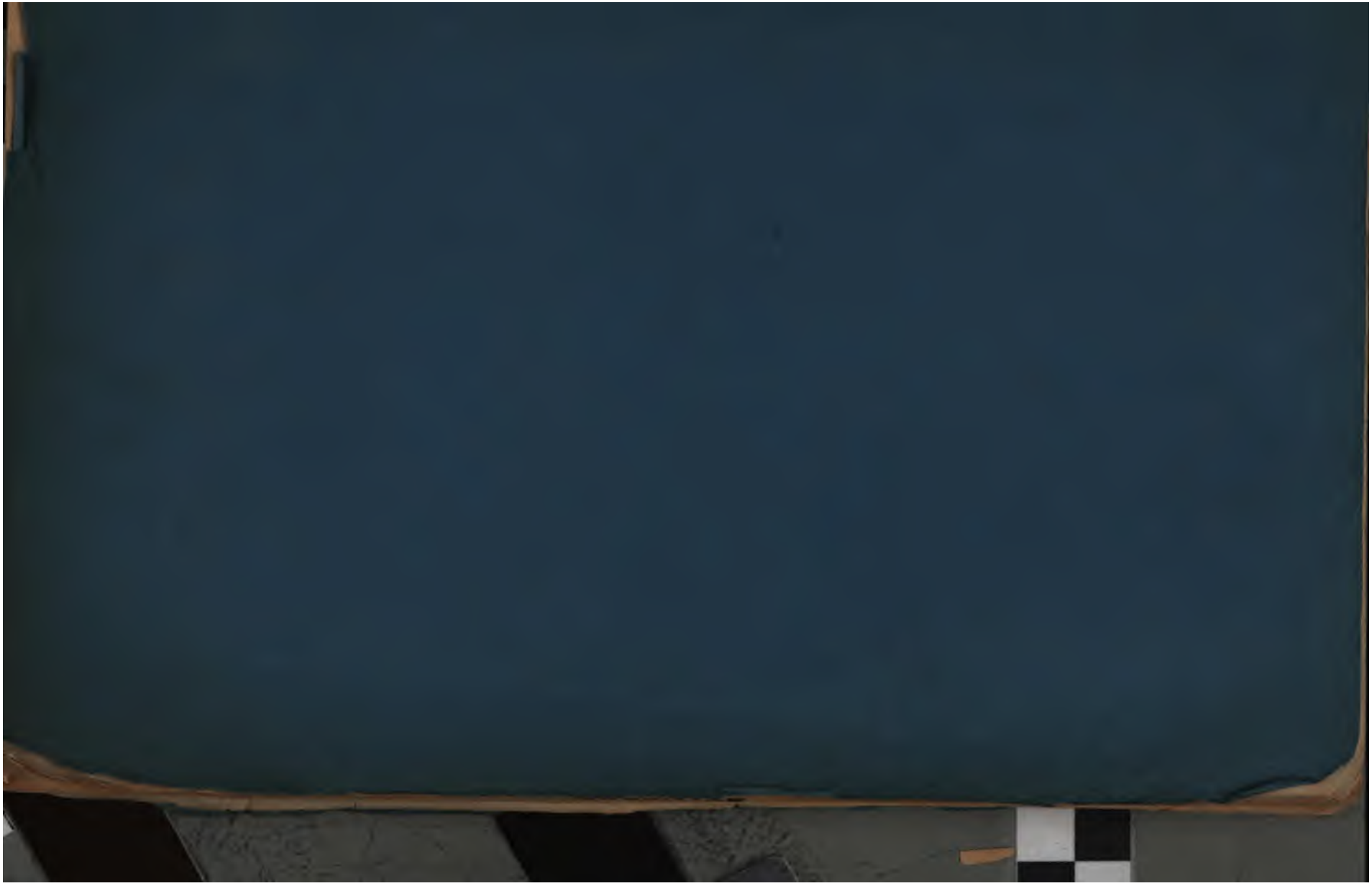
| | | Cents. | |
|---|---|---|---|
| Reading | Railroad..... | 13.66 | |
| Boston and Worcester | " ..... | 18.00 | |
| Boston and Lowell | " ..... | 13.50 | |
| Western (Mass.) | " ..... | 13.75 | |
| Baltimore and Ohio | " ..... | 18.30 | |
| | | —— | 77.21÷5=15.44 |
| | and 15.44÷5 | | = 3.09 |

2nd. Deterioration of iron, not yet settled by experience. Half of this wear is believed to be chargeable to locomotives and tenders, on account of their greater weight. Suppose rail cost $7,000 per mile, and will bear transport of 20,000,000 tons on a level road, average (say) 250 tons freight per train, equal to 80,000 trains. The cost per train will be $8.75; and half of this is. ..... 4.37

—— ..... 7.46

44.79

The weight of engines in the cases above detailed is not known, but is supposed to average less than 15 tons; for an engine of 20 tons on driving wheels would require an additional expense; but the fuel on the line of road under consideration would be less expensive, about seven cents, than the average for the same size of engine. In view of both considerations, it is believed a reduction should be made from the preceding result of (say)..... 4.79

And the estimate for a 20 ton engine is....Cents 40.00

Forty cents per train per mile, equivalent to 1*s.* 8*d.* sterling.